Mirrors of Salt

Edited by
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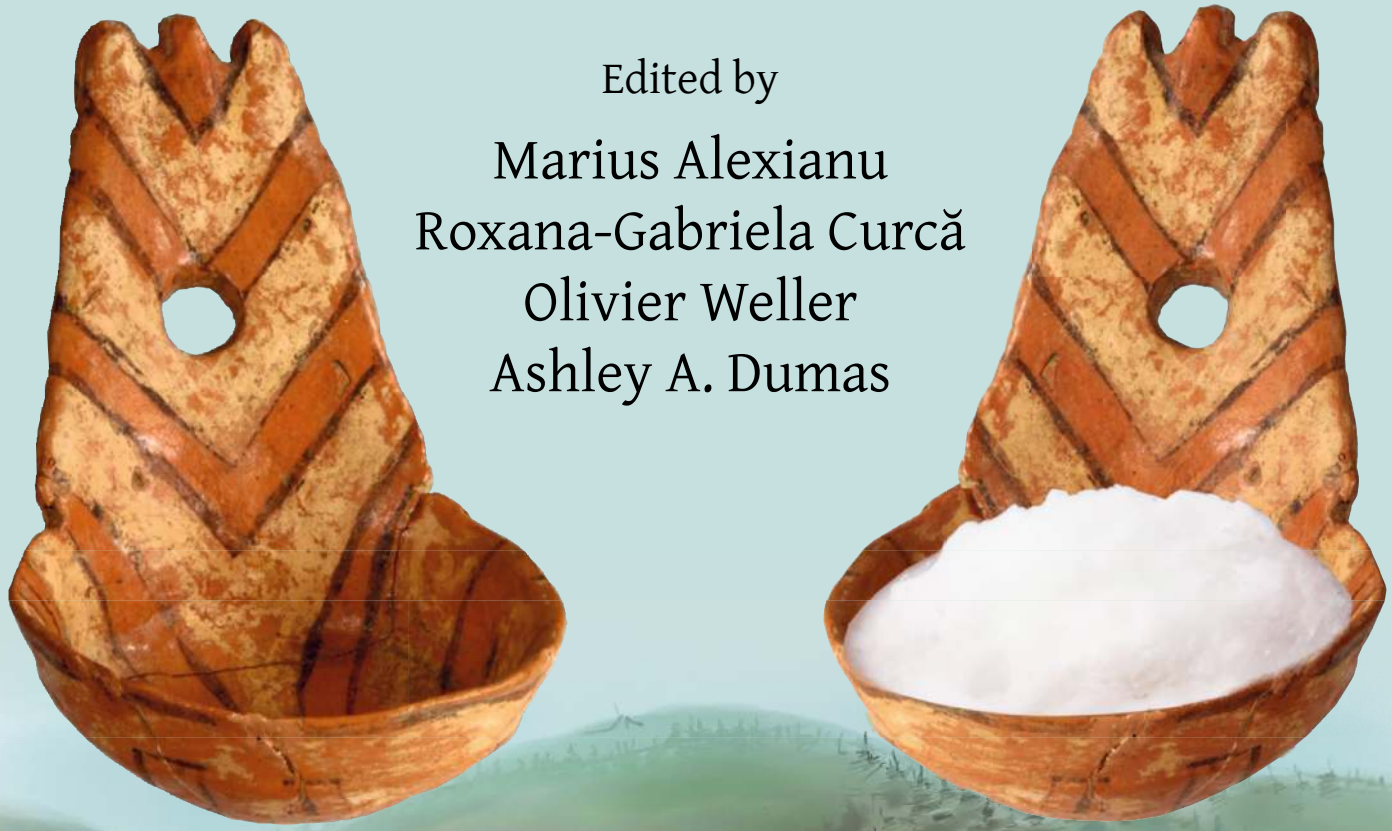
Ashley A. Dumas



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Mirrors of Salt

Proceedings of the First International Congress on the Anthropology of Salt

20-24 August 2015, 'Al. I. Cuza' University, Iași, Romania

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Cover: Cucuteni typical ladles, Romania (photo: C. Preoteasa).
The production phases of salt crystallization in Cacica, the Cucuteni culture (Mugur Andronic).

Acknowledgments: This work was supported by a grant of the Romanian National Authority for Scientific Research, CNCS-UEFISCDI, project number PN-II-ID-PCE-2011-3-0825, 219/5.10.2011, The ethno-archaeology of the salt springs and salt mountains from the extra-Carpathian areas of Romania.

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Foreword

Three main factors contributed to the development of the concept of the anthropology of salt which I proposed in 2012. Firstly, the numerous ethnological surveys carried out as part of two Romanian exploratory research projects on the ethnoarchaeology of salt, Ethnosal and EthnosalRo, led me to notice with surprise that from a young age the inhabitants of Romanian villages located in the vicinity of salty springs acquired an integrated knowledge of the interconnecting facets of the topic of salt. Secondly, I was influenced by an amazing holistic book on salt dating back to the Spanish Renaissance (Gomez Miedes 1579, 2003), and thirdly, I was aware that not many contemporary books examined all the diverse aspects of salt. I gradually realized that in order to understand the true complexity of the role played by salt in the evolution of human societies everywhere it would be necessary to revisit the Rennaisance model while adapting it to current studies and methodologies. This goal could only be achieved, in my opinion, by studying the anthropology of salt.

That idea led us to organize a symposium in 2012 to test the validity of my new conceptual approach to the anthropology of salt by studying a salt-rich country, focusing on the example of Romania. Although the specialists in different areas who participated were unable to cover all the aspects they would have liked, they did find, with mutual surprise, how different approaches could be applied to the same subject of research: common salt. It is important to note that the intention was to test the anthropology at a national level, in this case examining salt in Romania. The surprise was that some Romanian researchers had also studied salt world-wide as well as at the national level. This outlook was also demonstrated by several studies submitted for publication by researchers outside of Romania who showed interest in the innovative theme of the Iași symposium. We realized that our initial intention to study the anthropology of salt at a national level could productively be extended to cover its study on the international plane. That is why the published works were divided into two primary sections: the anthropology of salt in the world and the anthropology of salt in Romania (Alexianu *et al.* 2015).

These developments led to the organization of another scientific gathering, this time at an international level. The main organizers of this event hesitated for a while when it came to selecting a name, deliberating over whether to define it as a symposium, a colloquium, a conference or a congress. Considering the enormous potential of the anthropology of salt we chose the last option, which was obviously very ambitious but suitable for covering the many topics generated by salt and the numerous disciplines which are involved in the research of this mineral.

This First International Congress on the Anthropology of Salt was organized within the EthnosalRo project. For financial reasons the date for this congress could not finally be set until six months before it actually took place on 20-25 August 2015. Obviously, this time frame was insufficient to ensure widespread promotion; however, contributions from 29 countries across four continents (Europe, America, Asia, Australia) were submitted. The many presentations were organized according to five major themes: anthropology and archaeology (47 presentations), history (14), halotherapy (8), heritage (22), and literary and linguistic approaches (7). Contributions on the archaeology and anthropology of salt attracted the most submissions, with 12 key presentations from the USA, China, France, Japan, Mexico, UK, Mongolia, India and Romania (Caliniuc *et al.* 2015). Contributing to the success of this congress were the energetic and pertinent activities of the event coordinator, Dr Roxana-Gabriela Curcă, who was assisted by then PhD candidate Mihaela Asăndulesei, and by Masters student Ștefan Caliniuc. Also worthy of mention are the other members of the organizing team, including Prof. Dr Gheorghe Romanescu [†], Dr Andrei Asăndulesei, Dr Vasile Cotiugă and Dr Felix-Adrian Tencariu. Amongst foreign participants, we appreciate the very welcome financial support given by Dr Olivier Weller (CNRS – Paris). A special mention is due to the co-editor of this volume, Dr Ashley Dumas (University of West Alabama), who has undertaken the complex and difficult task of ensuring the necessary standard of language for submissions from authors who are not native speakers of English. Our special thanks for the contribution made to the editing of this volume go to Dr Felix-Adrian Tencariu and PhD candidate Radu-Alexandru Brunchi.

As usual, not all attendees submitted their articles or studies. In place of these the editors were happy to publish other authors who found out too late about the organization of this congress, but showed great interest in the new challenge of the anthropology of salt. The number of papers submitted by Romanians was almost equal to that of foreign authors. This fact should not be considered a deficiency. The guiding principle of this type of congress consists precisely in spreading the knowledge of research on salt from different areas of the globe.

International participation at the First International Congress on the Anthropology of Salt, organized under the above-mentioned conditions, was encouraging but obviously did not exhaust the huge potential of this emerging discipline. This is why we believed that the next congress which took place between 12 and 16 October 2017 in the famous resort of Los Cabos, Mexico, in the homeland of the salt goddess Huixtocihuatl and of one of the world's largest salt-producing centres, Guerrero Negro, would mark an important step forward in the evolution of research into the role of common salt in the development of human societies everywhere and in all times.

Marius Alexianu

References

Alexianu, M., Curcă, R.-G. and Cotiugă, V. (eds) 2015. *Salt Effect: Second Arheoinvest Symposium: From the Ethnoarchaeology to the Anthropology of Salt* (BAR International Series 2760). Oxford: Archaeopress.

Caliniuc, Ş., Asăndulesei, M., Curcă, R.-G. and Alexianu, M.-T. (eds) 2015. *First International Congress on the Anthropology of Salt: Book of Abstracts*. Iași: Editura Universității 'Alexandru Ioan Cuza' din Iași.

Gomez Miedes, B. 1579. *Commentariorum de sale libri V*. Valentiae: Ex Officina Petri Huete.

Gomez Miedez, B. 2003. *Commentarios sobre la sal, vol. I-III.* Introducción, edición crítica, traducción annotada e índices a cargo de Sandra Inés Ramos Maldonaldo. Prólogo de Antonio Malpica Cuello. Madrid: Alcañiz.

Theoretical Approaches

Salt: Anthropology of a Quasi Amethodic Topic. Some Thoughts

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'Alexandru Ioan Cuza' University of Iași

Abstract

The first part of this paper presents the tradition of systemic treatment with integrative tendencies of the topic of salt specific to western knowledge, starting with Greco-Latin antiquity. Based on analyses of representative syntheses, I aim to ascertain the paradigms for studying the topic of salt across several stages of scientific evolution. In this sense, the themes of salt taken into consideration are listed, along with their degree of interconnectivity.

In the second part, after the critical analysis of the previous models of prescientific and scientific inquiry into the topic of salt, characterized by a high level of complexity and heterogeneity, I conclude that only the recourse to an anthropological approach can ensure the integrative, systematic, coherent, and adequate research of this topic.

Keywords: anthropology of salt, history of salt.

Introduction

Common salt (NaCl) is the non-metallic mineral which has most strongly marked almost all sectors of human life (from nutrition, conservation, economy to specific technologies, disciplines and sciences). For this reason, it is not an exaggeration to state that salt is a quasi-panergetic (from Gr. *panergétes*, all-effecting) element. During the last decades, salt's area of influence reached a high level of development, impossible to anticipate as late as the middle of the last century. The variety of themes related to salt and the multitude of disciplines and sciences involved reflect the great variety and amplitude of human reactions from the most ancient times until the present. Salt is a topic that is a simple interface that hides a complex context, the so-called simplexity (Kluger 2008).

In this section, I will examine the representative books on salt throughout history; how our knowledge of salt has developed; and the possibility of establishing an autonomous discipline concerning salt.

Configuring an answer starts from the analysis of a few syntheses, representative of the western worldview and genuine cognitive metaphors for the periods in which they were produced. I will trace the paradigms for studying the topic of salt across several stages of human development in order to identify the themes of salt taken into consideration and how they are interconnected. I would like to emphasize that the interconnectivity analysis was applied for the first time with the work of Gomez Miedes (Ramos Maldonaldo 2003, C). After the critique of the previous models for approaching the topic of salt, my conclusion - and at the same time my proposal – is that the Anthropology of Salt as a discipline can ensure the systematic, coherent, adequate and integratory study of this topic with a very high degree of complexity and heterogeneity.

Salt approaches in Greco-Roman antiquity

In the texts that survived from ancient cultures, references to salt vary in frequency, reflecting empirical cognitive reactions. This phenomenon was more intense during Greco-Latin antiquity, a period distinguished by the appearance and development of systematic approaches.

We know from indirect references that ancient Greek culture produced several books written on salt or on salt and other minerals. Unfortunately, all these works have perished. The most important seems to have been Theophrastus' treaty *On Salts, Soda and Alum*. A rather brief compilation concerning salt was made by Pliny, relying foremost on Theophrastus, but also on passages by Aristotle and Varro (cf. Pliny, book XXI, paragraphs 73–105). Because many ancient works have been lost, we do not know how many of the possible themes of salt were overlooked by Pliny. Some insight can be drawn from the titles of the sections in the treaty:

> *De salis generibus et confecturis et medicinis observationes* / Types of salt, preparing them, observations concerning specific remedies;
> *De salis auctoritate historica* / The historical importance of salt;
> *Spuma salis / Foam of salt;*
> *Flos salis / Flower of salt;*
> *Salsugo / Saltness, salt-water, brine;*
> *De garro / About fish-sauce;*
> *De muria / About salt liquor, brine, pickle;*
> *De alecce / About the sediment of a costly fish-sauce, the sauce prepared from small fish, fish-pickle, fish-brine;*
> *De natura salis / About the nature of salt.*

Specifically, Pliny addressed the following topics (synthesized by Carusi 2008): the various ways and places where salt is formed spontaneously in nature and where it can be produced artificially; characteristics and uses of certain types of salt; examples of the importance of salt in daily life, history, political and military events, and sacred rites; the properties of *flos salis* and *salsugo*/*salsilago*; the properties of *garum*, its main areas of production; their sauces based on fish, including uses in the medical field; and the nature and healing properties of salt. We can appreciate Pliny's comprehensive approach, notwithstanding the simple juxtaposition in the chapters.

But beyond the systematic approach, Greco-Latin antiquity is notable for highlighting the altogether overwhelming importance of this mineral for the material and spiritual life of humans. To give some examples, common salt (NaCl) was considered by the ancient authors as a divine, universal element (Homer) of maximum utility (Plutarch) that distinguishes civilized peoples from barbarians (Homer, Pliny, Caesar), with a decisive role in the preservation of meat (the soul of the lifeless meat) (Plutarch), and also metaphorically denoting intellectual pleasures (Pliny).

As previously mentioned, only one general approach made by Pliny on the subject of salt (in one book concerning water remedies) has survived. But several recent syntheses (Carusi 2008; Moinier 2012; Moinier & Weller 2015) have systematised and ordered the multitude of empirical ancient references on salt found in works of various genres and literary forms of antiquity, from poetry to scholarly texts.

But in none of the Greek and Latin writings did salt constitute a topic difficult to address.

16th century

'Auget praeterea obscuritatem hanc tantam angusta quasique ἀμέθοδος argumenti ratio' (Gomez Miedes 2003 I, 4, 6). Made over four centuries ago, this straightforward statement claims that the topic of salt is a quasi amethodical one. The author, **Bernardino Gomez Miedes** (1515–1589) resorts, in a Latin text, to a Greek term in its original rendering. As an adjective, ἀμέθοδος, -ον means (1) `not in logical (i.e. syllogistic form) and (2) `without plan or system, esp. Medic, non-methodic' (Liddell, Scott 1996: 79), or, according to another dictionary `qui n'a pas de plan *ou* de méthode' (Bailly 1996: 95).

To overcome this amethodic quandary, the author, an exponent of 'integral or totalizing theological humanism' (Ramos Maldonaldo 2003: CXVII), arranges the subject matter into five books: I. *De sale physico siue phylosophico*; II. *De sale medico sive empirico*; III. *De loco, modo et tempore salis in mensa*; IV. *De sale geniali sive iocoso*; V. *De sale mystico sive theologico*.

The main themes addressed were highlighted in the preface (Ramos Maldonado 2003: CXI-CXVI) of the re-edited work (Gomez Miedes 2003). Below, I summarize Gomez Miedes' divisions of the importance of salt, leaving out various digressions irrelevant to the topic.

Liber I. Salt: definition, types, forming; the taste of salt; the benefits of salt for health, preserving meat, embalming bodies, mummies; the effects of salt on terrestrial and four-legged animals, on birds and insects; the fecund and aphrodisiacal power of salt, theories on the origin of sea saltiness, properties of seawater.

Liber II. Salt — useful for supplying armies, it foretells rains, preserves foods, is a reliable medicine, the pre-eminence of salt in relation to gold or precious stones; the chemical properties of salt; salt in alchemy; salt and its derivatives, the causes, methods and instruments for refrigeration; halophile plants and trees; the efficacy of salt for various diseases; list of the most renowned places rich in salt; types of salt (natural and artificial); types of obtainment; rock salt: definition and qualities.

Liber III. The table is the place of salt; the central place of salt on the table; salt is served first and taken last; why is salt placed at the centre of the table; the consumption of salt throughout the day; recommendation for a moderate consumption of salt.

Liber IV. The eulogy of salt in a figurative or allegorical sense as a synonym for human 'grace': Miedes novelty from Pliny: 'Nothing is healthier for the human spirit than salt'. Definition and coverage of what is salted. The sources of these *sales*: nature or art? Classifying *sales*: natural and artificial salts, verbal or action *sales*, admirable or risible *sales* — everything sprinkled with examples, anecdotes and jokes. The spirit can reach maximum and perfect seasoning through the mystical and theological salts.

Liber V. Thesis: the divine mysteries of salt are efficient for the curing of the spirit. Defining mystic salt. Analogy, tropology and allegory. Transfer/transition from natural salt to mystical salt. Salt as an element of connection between the divine and the human. Religious ceremonies involving salt. Proverbs, sayings and sentences in relation to salt as a medicine that supplies the virtues necessary for healing the spirits, extirpate vices and treat sins. Pontifical salt. Perfecting the spirit for tasting the divine and celestial salt.

To render a series problem more attractive, Gomez Miedes creates a literary scenario in which several imaginary characters appear, the accusers, *anthalistae*

or detractors of salt, and the defender, Juan Quintano, an avid consumer of salt. Gomez Miedes assumes the name Metrophilus, that is 'the lover of moderation', who defends moderation in the use of salt. Each argue their position in front of a judge, that is, the reader (Ramos Maldonado 2003, vol. I.: LXXXIII). We are thus presented with a *universa encyclopedia*. But the descriptive level is augmented, as the very title of the work indicates (*Commentarii de sale*), with commentary. As remarked in the Conclusions (Ramos Maldonado 2003: CLXV), Gomez Miedes' commentary 'nourishes from problems, from doubts, searches and from experiences that serve as the incentive for forming one's own thinking, converting into an intellectual stroll (ultimately an essay) along a road full of contrasts and in which the diversity of landscapes drives the abundance of ideas that flow naturally in the discourse'.

Innovative for its age, the sentence 'nothing is healthier for the human body and spirit than salt', illustrates, in modern terms, a surprising holistic aspiration. Gomez Miedes was certainly ahead of his age (Figure 1).

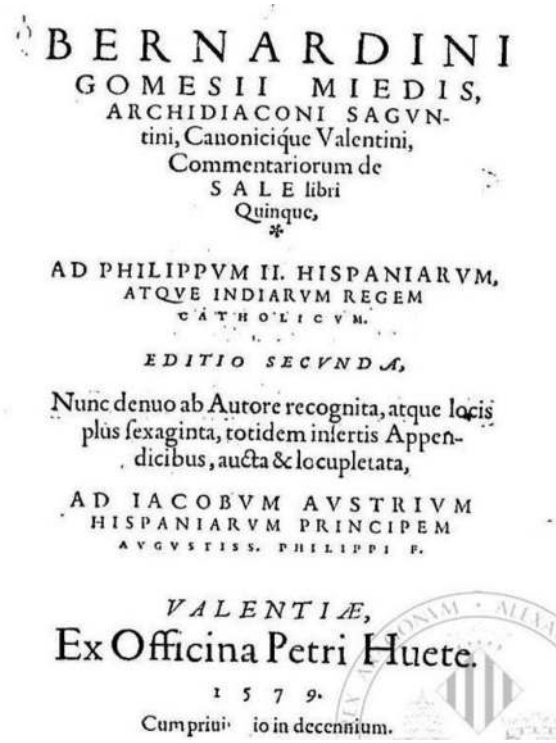

BERNARDINI
GOMESII MIEDIS,
ARCHIDIACONI SAGVNtini, Canonicique Valentini,
Commentariorum de
SALE libri
Quinque,
AD PHILIPPVM II. HISPANIARVM,
ATQVE INDIARVM REGEM
CATHOLICVM.
EDITIO SECVNDA,
Nunc denuo ab Autore recognita, atque locis plus sexaginta, totidem insertis Appendicibus, aucta & locupletata,
AD IACOBVM AVSTRIVM
HISPANIARVM PRINCIPEM
AVGVSTISS. PHILIPPI F.
VALENTIÆ,
Ex Officina Petri Huete.
1579.
Cum priui· io in decennium.

Figure 1. Bernardino Gomez Miedes, Commentariorum de sale libri quinque, Valentiae, 1579 – Cover.

19th century

Matthias Jakob Schleiden (1804–1880) (Figure 2), eminent German botanist, one of the founders of cell theory, had the surprising idea to write three monographs: one on a flower, one on an animal, and one on a mineral. All reveal an unexpected insight into the spiritual world of this scientist. By selecting salt of all minerals, it follows that Schleiden held this mineral as the most important. Even though he was not aware of Miedes' work (which is not listed in the bibliography), he tries to find a coherent and modern approach to the subject. Many of Miedes' emphases are nevertheless apparent as dimensions of Schleiden's work. Schleiden addressed the historical, geographical, linguistic, cultic, literary, economic, folkloric, scientific, technological, etc. aspects of the topic. Much attention was put into ordering the very extensive material at hand, and the table of contents (translated now from German to English) reflects this much better than any summary, inevitably incomplete:

Part one. Salt in the beginnings of culture

Introduction p. 3. People that [still] did not use salt p. 3. Agriculture and use of salt p. 5. Ash from plants instead of salt p. 8. Salt of the steppes and salt (halite) sediments p. 9. House of salt p. 9. Sea salt p. 10. Salt springs p. 10. The opinions of the ancients on the nature of salt p. 11. Refining salt p. 11. The Celts p. 11. The workers of the salt mines of Halle p. 12. Terminology of salt p. 13. Origin of the word *salt* p. 15. The traffic of salt p. 18. The six great areas of salt commerce p. 20. I. Asia p. 20. II Africa p. 22. North America p. 26. IV The Mediterranean and the Pontus p. 28. The ancient links between the Pontus and the Baltic Sea p. 30. Central Europe p. 33. The Northern Sea and the Baltic Sea p. 39. The herring p. 44. The origin of the word *herring* p. 51. Salt in Russia p. 67. Salt as a monetary unit p. 68. Salt as a national symbol p. 70. Salt in cultic contexts p. 73. Salt at baptism p. 76. Salt in superstitions p. 77. Salt in cultic contexts among Greeks p. 81. The cult of salt among Romans p. 81. Salt in war p. 81. Salt as an offering and salary p. 82. Manners to use salt p. 82. Salt as cleaning agent p. 83. Salting p. 85. Mummification p. 90. Symbolism of salt p. 90. Salt as seasoning p. 91. Salt as nervous excitant p. 92. Salt – cause of sterility p. 93. Taxing salt p. 96. Salt in animal feeding p. 100. Salt as a sign of lacking value p. 100. Observations p. 102.

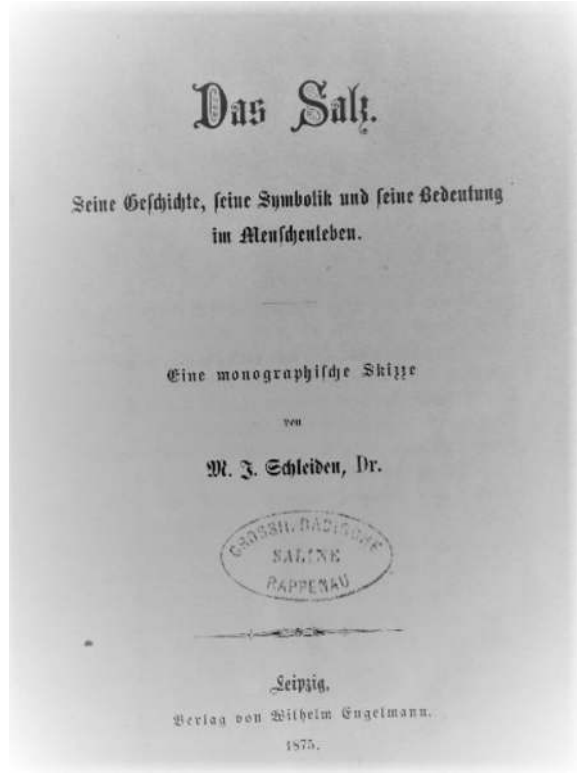
Part two. Salt under the influence of modern culture p. 125.

Section one. The nature of salt, its appearance and origin p. 127. The chemical composition of common (kitchen) salt p. 127. The chemical and physical characteristics of salt p. 135. Salt in all of Earth crust's formations p. 137. The appearance of salt on dry land p. 141. The environment of the Dead Sea p. 141. Transylvania p. 142. the Pyrenees p. 143. Ilezkaja [Ilek, Orenburg] p. 144. The salt ores of the Alps p. 144. The area with salt of Hungary p. 147. The saliferous basins from Thuringia to Magdeburg p. 151. The saliferous basis of Wetterau p. 157. The saliferous basins of France p. 159. The salt lakes p.161. The Aral and Caspian Sea p. 161. The Dead Sea p.162. Salt lakes from Asia to

Western Asia p. 163. Sea or refined salt p. 165. Portugal and Spain p. 166. France p. 167. Volcanic salt p. 167. The exclusively marine origin of salt p. 168.

Section two. Producing, commerce and industrialisation; the economics of salt as a measure of civilisation p. 176. Production in various areas p. 178. Europe p. 178. Asia and Africa p. 184. America p. 185. Australia p. 186. The value of the salt production p. 186. How much salt does man need? p. 187. The importance of salt in human feeding p. 188. The importance of salt in domestic animal feeding p. 196. The physiological problematics p. 201. Salted food and fertilising the soil with salt p. 206. Salt in industry p. 207. Forms under which salt occurs p. 208. Refining salt by evaporation (Dornstein and Hallerde) p. 210. The mother solution p. 211. Salting p. 211. Industries requiring salt p. 212. Soda and sodium sulphate p.213. Soap p. 215. Glass manufacturing p. 216. Hydrochloric acid and the whitening process p. 127. The leather industry p. 219. Pottery manufacturing p. 219. Refrigerant liquids p. 220. The production of files and rasps p. 220. The breweries and tobacco mills p. 220. Taxing salt p. 221. Observations p. 226.

Schleiden's struggle to control the immense body of information is reflected in the two large and rather vaguely-defined eras, respectively 'the beginnings of culture' and 'modern culture'. He stresses that the various dimensions of salt have changed under the influence of modern culture or, in other words, with the variegated transformations in society, the parameters by which salt was perceived also changed. Very interesting is the extension of the domains under consideration. Relying on previous research, Schleiden highlights, for instance, the linguistic dimension (the lexicon of salt in Indo-European and non-IE languages). Chapter II is a remarkable attempt to cover as many practical domains as possible (foremost preserving herring). The work aims to cover as many aspects as possible, but only portions exhibit a high degree of integration, such as, in part I, salt in antiquity, the great areas of salt trade, or salt in cultic contexts. Part II is better structured and divided into two sections: (1) The nature of salt, its appearance and origin; (2) Producing, trade, industrialization. Noteworthy is the introduction of novel themes, such as salt production in various parts of the world, the uses of salt in various industries, in particular the chemical industry. In this part, the interconnectivity is high, well-argued and warranted. Nevertheless, despite the attempts to produce a homogenous work, we cannot avoid the feeling that an encyclopaedic book by an author could not have exhausted the complexity of the topic, nor order the natural heterogeneity of the aspects under consideration.


Das Salz.

Seine Geſchichte, ſeine Symbolik und ſeine Bedeutung im Menſchenleben.

Eine monographiſche Skizze

von

M. J. Schleiden, Dr.

GROSSH. BADISCHE SALINE PAPPENAU

Leipzig.

Verlag von Wilhelm Engelmann.

1875.

Figure 2. M. J. Schleiden, Das Salz. Seine Geschichte, seine Symbolik und seine Bedeutung im Menschenleben*, Leipzig, 1875 – Cover.*

20th century

The book by **Robert P. Multhauf** (1919–2004) (Figure 3) is the next fundamental work on the problematics of salt. The author was an American science historian with a chemistry background (Multhauf 1966; 1984). The fact that he worked for the Smithsonian Institution largely explains his openness towards the humanities.

The author states explicitly that his goal is to write a book on salt, obviously as complete as possible. Of particular interest is that he acknowledges the contributions brought by archaeology to the study of salt, integrating them for the first time into a synthetic work. Multhauf focuses on the historical and technological aspects of salt (see Annex 1). The work is structured along chronological lines, with due regard to the major shift in the role of salt that has occurred since the middle of the 19th century. The first part is entitled *The Age of Culinary Salt from antiquity to around 1850*; the second, *The Era of Chemical Salt*, furthers the discussion up to the 1980s.

Multhauf's book, which pays express homage to Schleiden's, falls in the same line of works meant to be complete syntheses. Inevitably, some of the content had to repeat, so the necessity for a new book rests

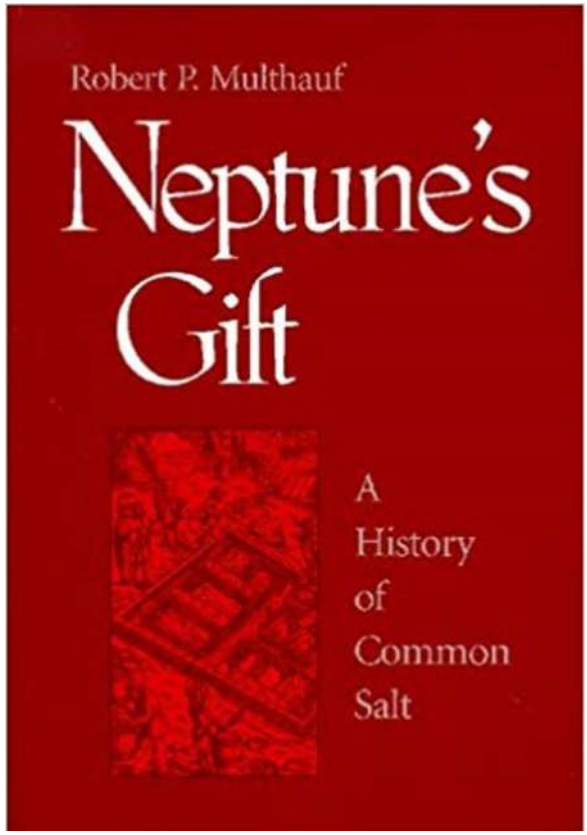


Figure 3. Robert P. Multhauf, Neptune's Gift. A History of Common Salt[2]*, Baltimore, 1996 – Cover.*

Figure 4. Jean-François Bergier, Une histoire du sel, *Fribourg, 1982 – Cover.*

on completion. Nevertheless, despite the impressive erudition and the update with respect to the chemical industries using salt, it is clear that an entire series of topics was left unaddressed.

The Swiss historian **Jean François Bergier** (1931–2009) (Figure 4) continued from an economic perspective the body of fundamental works on salt, publishing a referential book (Bergier 1982), the title of which, *Une histoire du sel*, betrays its bounded scope. Bergier finds it necessary to refer to Multhauf's book concurrently with justifying his contribution, particularly in the humanities facet. The following paragraph is edifying for the vision of this disciple of Ecole des Annales: 'En 1978, Robert P. Multhauf a publié *Neptune's Gift. A History of Common Salt*. Ce livre important et le mien se complètent plus qu'ils ne se recoupent. Car l'historien americain des sciences s'est interessé plus particulièrement aux développements de la technologie du sel.' (Bergier 1982).

Salt toward an anthropological framework

In the last decade of the 20th century scholars began to advocate for the integration of the salt studies within an anthropological framework.

Pierre Le Roux, now Professor of Ethnology in France, was the first to bring into discussion the anthropological setting of salt: 'Le sel s'affirme ***en thème rassembleur et surtout anthropologique***, en ce sens que se penchant sur lui on arrive très vite à la pulpe vitale de la société, et le système dans lequel il s'inscrit prend, dans bien des cas....., des allures de **phénomène social total : sens (saveurs), symboles, mythes, rituels, croyances, présages, alliances, technique, économie, histoire** [emphasis added]**'** (Le Roux 1993: 25–26).

Even though we cannot make a clear distinction between themes and disciplines, and even if the invoked are extremely few, the anthropological perspective into which he finds it suitable to place the research on salt is markedly important. Le Roux is the first forerunner to the Anthropology of Salt.

Ian W. Brown, Professor of Anthropology and Archaeology at University of Alabama, used the term *Anthropological Perspective* in reference to salt in the Blount Undergraduate Initiative seminar class (Brown 2004).

Lothar von Falkenhausen, Professor of Chinese Archaeology and Art History at UCLA and co-principal investigator of a significant archaeological project

on ancient salt production in the Yanzi River basin (1999–2004), was the first to underline the relationship between salt production and human behaviour: 'salt production in our study area is in Durkheim's terms, a 'total social fact' – ***an aspect of human behaviour*** [emphasis added] that encapsulates the totality of social system' (Falkenhausen 2006: 15).

21st century — the anthropology of salt

The **term** Anthropology of Salt appears for the first time in the title of a volume of studies. In a review it is appreciated that 'this book (Alexianu et al. 2011) marks a turning point in the humanities. Unlike previous conferences in the last twenty years, which are purely historical or archaeological in scope, it brings together archaeologists, historians, philologists and linguists under the same umbrella' (Galanidou 2012).

The **concept** Anthropology of Salt was developed for the first time in a summary (Alexianu 2012). The article with the same title published three years later highlighted the extreme specialization that salt studies had reached with the consequence of their insularization, the absence of dialogue between different sciences and disciplines involved in different degrees in NaCl research, the need for all (over)specialized approaches to subsume under an integrative discipline (Alexianu 2015).

The Anthropology of Salt proposes a shift in paradigms in the sense that the objective is no longer to publish a encyclopaedic book, but to create a systematic and coherent framework to bring together all the disciplines and sciences that are concerned with salt, albeit tangentially. Their number is impressive and, save for formal sciences, they belong to all scientific domains: natural sciences, social sciences, applied sciences, engineering and medicine, and humanities (Alexianu 2012, 2015). But our approach from 2012 overbids the cognitive dimension to the detriment of other dimensions.

An objection of a general character regarding the integrative knowledge of salt was given by **Bernard Moinier**, a professional of the salt industry, with a remarkable publishing activity on the topic of salt: `Can these bits and pieces of salt inheritance constitute a coherent whole once put together? Indeed, it may be judged thoroughly unsound by some academic experts' (Moinier 2015: 31).

This essential question, applied to the Anthropology of Salt understood as a unification of all disciplines and sciences related to salt (Alexianu 2015) paid due regard to mereology (Varzi 2019). The answers found, `Parts Generate the Whole but they are not identical to it' (Cameron 2014), alongside the idea of the priority of the Whole (Schaffer 2010) revealed the theoretical fragility of my first approach to the Anthropology of Salt: it did not provide a resolution for fulfilling the initial function of any science/discipline, namely to establish coherence with regard to matter at hand. This is why I argue that the only possibility to ensure a coherent scientific enterprise is to raise the conceptual level even higher. The most abstract and simultaneously most encompassing concept in this context is that of *human behaviour*, one of the guiding concepts of anthropology. It is not by accident that recent authors have started speaking about the 'biobehavior of the human love of salt' (Leshem 2009).

I put forward a tentative classification of the human behaviours towards salt as follows: (a) cognitive behaviours; (b) spiritual behaviours; (c) pragmatic behaviours; and (d) social behaviours. Considering the intrinsic links between the four types of behaviours (a–b; a–c; c–d), the principle of coherence of a scientific approach is fully complied with.

Anthropology of salt. A definition

Anthropology of Salt studies in principle the entirety of human behavioural reactions/behaviours towards salt in the context of the interrelations between humans and nature, wherein humans, as a part of nature, avail themselves on multiple levels of this essential mineral component of nature.

Scope

The fundamental scope of the Anthropology of Salt is to provide a holistic view, or one that respects the exigencies of the saturated model (Sacks 2010), of the role of salt in the evolution of human communities.

General principles

Anthropology of Salt proposes a diachronic, diatopic and multidisciplinary approach, while recognizing the value of monodisciplinary approaches as *sine qua non* premises of multi-, inter- and transdisciplinary approaches.

The most important consequence

The Anthropology of Salt ensures that studies on salt are no longer ancillary to other disciplines. Anthropology of Salt can now claim an autonomous place in the current system of disciplines and sciences.

Conclusion

Only an Anthropology of Salt can ensure the systematic, coherent, adequate, and holistic study of this complex topic.

Acknowledgments

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References

Alexianu, M. 2012. Anthropology of salt: a First Conceptual Approach, in M. Alexianu, R.-G. Curcă, V. Cotiugă, (eds.), *Second Arheoinvest Symposium, From the ethno-archaeology to the anthropology of salt. 20th-21st April 2012. Programme and abstracts*, Editura Universității Alexandru Ioan Cuza din Iași, Iași: 9-10.

Alexianu, M. 2015. Anthropology of Salt, a First Conceptual Approach, in M. Alexianu, R.-G. Curcă, V. Cotiugă, (eds) 2015. *Salt Effect. Proceedings of the Second Arheoinvest Symposium – From the ethnoarchaeology to the anthropology of salt, 20-21 April 2012, Al. I. Cuza University, Iasi, Romania*: 1-2. Oxford, Archaeopress, British Archaeological Reports, International Series 2198.

Alexianu, M., Weller, O., Curcă, R.-G. (eds) 2011. *Archaeology and Anthropology of Salt: A Diachronic Approach. Proceedings of the International Colloquium, 1-5 October 2008, Al. I. Cuza University (Iasi, Romania).* Oxford, Archaeopress, British Archaeological Reports, International Series 2198.

Bailly, A. 1996. *Dictionnaire grec-français*. Paris, Hachette.

Bergier, J.-F. 1982. *Une histoire du sel.* Fribourg, Office du Livre.

Brown, Ian W. 2004. *Salt of the Earth: An Anthropological Perspective*. Blount Undergraduate Initiative seminar class (BUI 301), The University of Alabama, Tuscaloosa, Alabama, United States of America.

Carusi C. 2008. *Il sale nel mondo greco (VI a.C. – III d.C.), Luoghi di produzione, circolazione commerciale, regimi di sfrutamento nel contesto del Mediterraneo antico*. Bari, Edipuglia.

Falkenhausen, L., von 2006. Background and Purpose of the Project. In S. Li, L., von Falkenhausen, *Salt Archaeology in China. Ancient Salt Production and Landscape Archaeology in the Upper Yangzi Basin: Preliminary Studies* 1: 11-27. Peking.

Galanidou, N. 2012. Review of Alexianu, M., Weller, O., Curcă R.-G. (eds), *Archaeology and Anthropology of Salt: A Diachronic Approach. Proceedings of the International Colloquium, 1-5 October 2008, Al. I. Cuza University (Iasi, Romania).* Oxford, British Archaeological Reports, International Series 2198, VII+226 p., 175 B&W&colour illustrations, 2011, Oxford, Archaeopress, *Antiquity*, vol. 86, No. 333: 935-937.

Gómez Miedes, B. 2003. *Comentarios sobre la sal. Edición a cargo de Sandra Inés Ramos Maldonado*: I-III. Madrid, Alcañiz.

Kluger, J. 2008. *Simplexity.* New York, Hyperion.

Le Roux, P. 1993 Introduction. Le sel, thème anthropologique. In P., Le Roux and J., Ivanoff (eds.), *Le sel de la vie en Asie du sud-est*: 5-29. Prince of Songkla University.

Leshem M. 2009. Biobehavior of the human love of salt. *Neuroscience and Biobehavioral Reviews* 33: 1-17.

Liddell H. G and Scott R. 1996. *A Greek-English Lexicon*. Oxford, Clarendon Press.

Moinier, B. 2012. *Le sel dans la culture antique*. Kaiserslautern, Mehlingen.

Moinier, B. 2015. Salt History or Salt in History ?. In M., Alexianu, R.-G., Curcă, V., Cotiugă (eds.), *Salt effect: Second Arheoinvest Symposium: from the ethnoarchaeology to the anthropology of salt April 2012, 'Al. I. Cuza' University, Iaşi, Romania:* 11-34. Oxford, Archaeopress, British Archaeological Reports, International Series 2760.

Moinier, B. and Weller, O. 2015. *Le Sel dans l'Antiquité ou les cristaux d'Aphrodite.* Paris, Belles Lettres.

Multhauf, R. P. 1966. *Origins of chemistry*, London.

Multhauf, R. P. 1978/1996. *Neptune's Gift. A History of Common Salt.* Baltimore, The Johns Hopkins University Press.

Multhauf, R. P. 1984. *History of chemical technology: an annotated bibliography.* New York.

Ramos Maldonado, S. I. 2003. Introducción. In B. Gómez Miedes, *Comentarios sobre la sal, I.* Introducción, edición critica, traducción anotada e indices a cargo de Sandra Inés Ramos Maldonado. Prólogo de Antonio Malpica Cuello: XIX-CCLVIII. Madrid, Alcaniz.

Ross, C. 2014. 'Parts Generate the Whole but they are not identical to it'. In A. Cotnoir, D. Baxter (eds.), *Composition as Identity*. Oxford, Oxford University Press.

Sacks, G. E. 2010. *Saturated Model Theory.* London, World Scientific.

Schaffer, J. 2010. The Priority of the Whole. *The Philosophical Review* 119 (1): 31-76.

Schleiden, M. J. 1875. *Das Salz. Seine Geschichte, seine Symbolik und seine Bedeutung im Menschenleben.* Leipzig, Engelmann.

Varzi, A. 2019. 'Mereology'. In E. N. Zalta (ed.). *The Stanford Encyclopedia of Philosophy*.

Annex 1

Multhauf R.P. 1978/1996 Neptune's Gift. *A History of Common Salt*, The Johns Hopkins University Press, Baltimore.
Contents:

The 'Sapientia' of Salt

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Abstract

The intake of sodium is essential to life. The daily requirement for a human being is 230-460 mg / day. The amount of salt present in natural foods is modest. The human being is endowed with cognitive systems that lead to the assumption of salt and to an endocrine/renal regulation which tends to avoid losses. In industrialized countries, the daily salt intake is around 10 grams per day; this excessive intake causes high blood pressure and thus cardiovascular diseases. State governments try to reduce this excessive intake by promulgating laws and promoting information campaigns. The powerful mechanisms of survival in an environment low in salt, under current conditions, lead to an excessive inflow of sodium. The ancient 'divina sapientia humani corporis' (sapientia from the latin 'sapere,' which means to taste or to smell something, to know, to be sapient) has become disadvantageous in the new modern world built by human beings. The physiological homeostatic mechanisms, adjusted to the minimum amount of salt present in natural foods, lead to salt abuse and fail to counter its effects. The exaggerated salt content in processed foods requires a mind control based on mental knowledge. A clear and concrete separation between different types of knowledge ('savoirs') is at play here. The painful dissonance causes orthorexia: abnormal control of quality and type of food that characterizes our society. 'Nova sapientia' that harmonize cultural, scientific, corporal, and institutional knowledge need to be developed.

Keywords: 'Nova sapientia', salt abuse, man-salt relationship.

The term 'Sapientia' comes from the Latin verb 'sapere' which means to taste or to smell something, to know, to be sapient. It is very interesting to notice that the same word indicates, at the same time, the corporeal feature of an object, the subjective sensation, the knowledge and the comprehension that are generated from this relation.

The essence of the living being is its integrative relation: the ability to receive information and to process and implement the appropriate adaptive responses. Life is nothing but this ever-changing dynamic equilibrium that is continually renewed in accordance to internal and external changes. Life is the flow of information that gets embodied; it is the condition and adaptation that co-respond in an intimate dance, in a continually renewed identity; it is not a causal nexus, but synchronicity.

The living is this unbreakable harmony of adjustments and conditions, this unitary symbol which is not reproducible otherwise, from the Greek συμ-βάλλω, put together, to tune (Enciclopedia Treccani 2014).

Life began in sea water. Living beings who ventured out of the sea are made of a peculiar physiological mechanism. The force of gravity, since the weight is no longer supported by the pressure of the liquid, manifests itself in support structures such as the bones. The oxygen dissolved in the air is 'embodied' in the lungs, the space and the ground are revealed, and reveal themselves, by the organs of locomotion (Morey-Holton 2003). The distance from salt water is balanced by the embodied osmotic homeostasis that keeps the billions of cells that make up our bodies immersed in the sea of the extracellular fluid (Antunes-Rodrigues et al. 2004). The membrane of each cell is a living border, freely permeable to water. Such a permeability needs and causes the osmotic pressure, which is what attracts and retains water, to remain equal on both sides of the cell membrane. Sodium is primarily responsible for the osmotic pressure in the extracellular liquid. This makes sodium extremely important, as it determines the capacity of the cell membrane, as well as the transmission of the nerve impulse, the muscle contraction, the volume of corporeal liquids, the blood pressure, etc.

A lack or an excess of sodium will cause serious health consequences and may even lead to death (Nijst et al. 2015; Goudie et al. 2006). The serum sodium levels are maintained within the limits compatible with life by a complex physiology that regulates intake and loss (Silverthon 2013). Sodium excretion essentially takes place in the kidney, where sodium is filtered by the glomerulus and can be reabsorbed in the tubules. This re-absorption is variable, as the loss of sodium in the urine oscillates in relation to the needs of the whole organism. This regulation is the result of a complex system that includes neurological, cardio-pulmonary,

vascular and endocrinological factors. The final effectors are mainly hormonal: aldosterone, which facilitates the resorption and therefore reduces the excretion, and the natriuretic factors (atrial and brain), which reduce the resorption and thus increase sodium loss (Boron and Boulpaep 2008). Sodium intake is provided by food. Fresh raw foods, such as fruit and vegetables, have a low sodium content. We assume that our ancestors' diets, as they were primarily herbivorous, was low in sodium (FAO 2014), with a daily intake of no more than 100mg (Denton 1982). The sense of taste, which supervises the entrance of substances into the body and has to quickly distinguish beneficial from harmful ones, recognizes salt and likes it. Thus, sodium enhances the taste of food. One hundred percent of ingested sodium is absorbed in the intestine (Morris et al. 2008). Corresponding with the limited availability of this element, essential to life, is a marked tendency to consume salt, a 'salt craving.' Numerous studies have investigated the mechanisms of this preference and the underlying role of genetics but also of personal experiences and of cultural influences (Beauchamp et al. 1990). The human being is a complex living unit, without comparison, an indissoluble presence of genetic and cultural heritage molded by personal experiences.

Our body is able to maintain normal levels of serum sodium even when sodium intake varies according to diet. The kidneys, through regulation of losses, and neuro-psycho-cognitive levels, permit the human being to be in consonance with the shortage of salt.

The amount of sodium consumed daily varies enormously from country to country and from person to person (Brown et al. 2009; Plaque 1980). The total consumption is constituted by a discretionary portion, constituted by salt that is added directly to food, and from a non-discretionary portion, constituted by the salt naturally present in the food and, above all, from the salt added to food during its processing phases (Stamler 1997). It is with the development of agriculture and of cattle-breeding the salt has been used as a food preservative. Since that time, salt intake has risen steadily, reaching an average of 18g/day in Europe in 19th century. Then, with the advent of refrigerators, the added salt decreased, but it is still plentifully added to industrial processed foods, not only as a preservative, but also to commercially exploit the 'salt craving'.

The result is that in Western countries there is excessive intake of sodium chloride, evaluated at around 10g per day. This means that since sodium is about 40% of salt's weight, about 4g are consumed, 174mEq (atomic weight and molar mass 22.989). Excessive sodium intake is associated with an increased incidence of hypertension, stroke, cardiac hypertrophy, osteoporosis, kidney stones, kidney damage, and gastric neoplasia (Bibbins-Domingo et al. 2010). Experts from the WHO recommend a daily intake of 2g (WHO 2013). The governments of many nations have studied and applied rules in an attempt to reduce the amount of dietary salt intake, and associations have arisen, such as the WASH (World Action on Salt and Health), with the aim of reducing the consumption of salt (World Action On Salt and Health 2015).

We may say that in the context of our evolutionary history, the addition of large quantities of salt in our diet is a recent phenomenon (covering approximately the last 5000 years). It appears that evolution has rendered us best adapted to handle far less sodium than we now consume. But the ancient 'sapientia humani corporis,' in the actual and new conditions produced by men, seems ineffective. The ancient mode that allowed our ancestors survive, in abundance, in a low-salt environment has become disadvantageous. In the same way, hunger, that was once an effective defense to the scarcity of food, seems now to have become only an unpleasant phylogenetic vestige to circumvent because it causes obesity. Scientific knowledge considers the instincts to be inadequate, and their appetites as harmful. A separation between the different 'knowledges' ('savoirs') of our being is taking place: the mind claims for itself the capacity to control the nutrition process, on the basis of scientific knowledge counterintuitive for the body, which is thus reduced to simple matter that has to be governed. This painful dissonance causes and increases orthorexia (from 'ὀρθός' correct and 'ὄρεξις' appetite), an abnormal control of quality and types of food that characterize our society (Hamam et al. 2015).

The various sciences, biology, medicine, anthropology, sociology, economics, etc., based on different paradigms and beliefs, approach the study of salt with unequal purposes and aims. The abundant scientific evidence from disciplines with dissimilar methods and mutually incomprehensible jargons, remains distant and difficult to integrate. The complexity, reduced to fragmented analysis, escapes a linear logic. Partial and different representations are just lifeless mixtures; they do not manage to become practical wisdom. The attempts of governments to regulate salt intake through rules and regulations have until now proven essentially ineffective (Newson et al. 2013). Some studies suggest the importance that social influences have on eating behaviors (Mollen et al. 2013; Higgs 2015). Food choices, as well as all human behaviors, are the manifestation of the most complex known system: the human being. As suggested by the law of Ashby (Ashby 1958): 'Control can be obtained only if the variety of the controller is at least as great as the variety of the situation to be controlled.'

A fabric made from threads of multiple knowledge needs more variety and complexity, but these separate threads should be woven to create a ' nova sapientia.'

A 'nova sapientia' needs more variety/complexity, it necessitates a fabric made from threads of multiple knowledge, as separate threads remain fragile if not intertwined.

The man-salt relationship (like the calories-obesity relationship), provides us the occasion (and the duty) to reformulate the old and inadequate beliefs and representations of the human being. This will allow for the rise of a 'nova sapientia' in which cultural, scientific, and bodily knowledge coexist harmoniously. This may be the opportunity to continue the intimate dance of oneness with the ongoing creation.

References

Antunes-Rodrigues, J., de Castro, M., Elias, L. L. K., Valença, M. M., and McCann, S. M. 2004. Neuroendocrine control of body fluid metabolism. *Physiological Reviews* 84: 169-208.

Ashby, W. R. 1958. Requisite variety and its implications for the control of complex systems. *Cybernetica* 1, 2: 83-99.

Beauchamp, G. K., Bertino, M., Burke, D. and Engelman, K. 1990. Experimental sodium depletion and salt taste in normal human volunteers. *The American Journal of Clinical Nutrition* 51: 881-889.

Bibbins-Domingo, K., Chertow, G. M., Coxson, P. G., Moran, A. E., Lightwood, J. M., Pletcher, M. J. and Goldman, L. 2010. Projected effect of dietary salt reductions on future cardiovascular disease. *New England Journal of Medicine* 362, 7: 590–599.

Boron, W. F. and Boulpaep, E. L. 2008. *Medical Physiology: A Cellular and Molecular Approach*. Philadelphia, Elsevier/Saunders.

Breslin, P. A. 2013. An evolutionary perspective on food and human taste. *Current Biology* 23: 409-418.

Brown, I. J., Tzoulaki, I., Candeias, V. and Elliott, P. 2009. Salt intakes around the world: implications for public health. *International Journal of Epidemiology* 38: 791-813.

Denton, D. 1982. *The Hunger for Salt: An Anthropological, Physiological, and Medical Analysis.* New York, Springer.

Enciclopedia Treccani on line '*simbolo*'. Available from http://www.treccani.it/enciclopedia/simbolo/. (29-05-2016)

FAO/INFOODS/TGI Global supplement database. Available from http://www.fao.org/infoods/infoods/tables-and-databases/faoinfoods-databases/en/. (29-05-2016)

Goudie, A. M., Tunstall-Pedoe, D. S., Kerins, M. and Terris, J. 2006. Exercise-associated hyponatraemia after a marathon: case series. *Journal of the Royal Society of Medicine* 99: 363-367.

Håman, L., Barker-Ruchti, N., Patriksson, G., and Lindgren, E. C. 2015. Orthorexia nervosa: An integrative literature review of a lifestyle syndrome. *International Journal of Qualitative Studies on Health and Well-Being* 10: 267-299.

Higgs, S., 2015. Social norms and their influence on eating behaviours. *Appetite* 86: 38-44.

Mollen, S., Rimal, R. N., Ruiter, R. A. and Kok, G. 2013. Healthy and unhealthy social norms and food selection. Findings from a field-experiment. *Appetite* 65: 83-89.

Morey-Holton E. R. 2003. The impact of gravity on life. *Evolution on Planet Earth*: 143-159.

Morris, M. J., Na, E. S. and Johnson, A. K. 2008. Salt craving: the psychobiology of pathogenic sodium intake. *Physiology Behaviour* 94, 5: 709-721.

Newson, R. S., Elmadfa, I., Biro, G., Cheng, Y., Prakash, V., Rust, P., Barna, M., Lion, R., Meijer, G. W., Neufingerl, N., Szabolcs, I., Zweden, van R., Yang, Y. and Feunekes, G. I. J. 2013. Barriers for progress in salt reduction in the general population. An international study. *Appetite* 71: 22-31.

Nijst, P., Verbrugge, F. H., Grieten, L. Dupont, M., Steels P., Tang W.H. and Mullens W. 2015. The pathophysiological role of interstitial sodium in heart failure. *Journal of American College of Cardiology* 65: 378-88.

Plaque, C. 1980. Saharan Bedouins and the salt water of the Sahara: a model for salt intake. In M. R. Kare, M. J. Fregly, R. A. Bernard (eds.) *Biological and behavioral aspects of salt intake*: 31-47. New York, Academic Press.

Silverthon, D. U. 2013. *Fisiologia Umana.* Milano, Pearson Education Italia.

Stamler, J. 1997. The INTERSALT Study: background, methods, findings, and implications. *The American Journal of Clinical Nutrition* 65: 626–642.

WHO, Fact sheet on salt reduction. Available from http://www.who.int/mediacentre/factsheets/fs393/en/. (29-05-2016)

World Action On Salt and Health. Available from http://www.worldactiononsalt.com/. (29-05-2016)

Archaeology

The Qraya Salt Experiment. Reenacting Salt Production Processes of Protohistoric Mesopotamia

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Abstract

Qraya is a small site on the middle Euphrates in Western Syria: excavations carried out between 1977 and 1984 gave abundant evidence for late fourth millennium occupation. The diminutive size of the site and the lack of monumental architecture indicates that this was not an urban site; and yet, some of the vessels, in particular the so-called beveled rim bowls, were found in very large quantities, such as are normally associated with large scale activities typical of early urbanism. An experiment was carried out in 1989 to test the hypothesis that these vessels could be used in the production of salt destined for the large contemporary cities in the north (where salt was lacking). At Qraya, salt could be procured in raw form in the nearby playas of Bouara, and could be processed easily with the abundant water from the Euphrates river. The experiment was successful, and it is presented here in full detail. The whole inventory of artifacts found at the site can be explained in function of the process entailed in the production of salt. The beveled rim bowls, in particular, can be seen to have served as ideal vessels for both the production and the conservation of salt. Importantly, this speaks to a unusual trade model, one that was initiated by the cities in the north specifically to exploit a distant natural resource (the salt from the playa), by processing it and shipping it to the cities in the north.

Keywords: Syria, Qraya, Terqa, chalcholithic, salt, beveled rim bowls.

Introduction

The project: chronicle and authorship

The Qraya experiment in salt production was initially suggested by Beatrice Hopkinson, following a presentation at UCLA of Buccellati's excavations at the site of Qraya, in eastern Syria. She remarked that some of the vessels, which she had seen first in the slides and then in the actual sherds, was remarkably similar to that used in salt producing sites in Europe, with which she was intimately familiar. She suggested that it may be worthwhile to make a test to verify the plausibility that these vessels may indeed have been used to produce salt cakes. Taking her up on this suggestion, Buccellati organized a study trip to Syria to test the hypothesis.

The trip took place in the early fall of 1989. Buccellati and Hopkinson spent several days at the field house of the Terqa Expedition in Darnaj, across the Euphrates river from Ashara (Figure 1). The house had been built by Buccellati during the years in which he served as Director of the Joint Expedition to Terqa, and had been turned over to Olivier Rouault when he took over the excavations at Terqa. Some of the material originally excavated in Qraya was stored in the house and was thus readily available for the experiment.

The starting point of the experiment was the procurement of raw salt from the salt playas of Bouara, to the east of the Euphrates. The experiment lasted for a few days and was carried out on the edge of the courtyard facing the house, which fronted the Euphrates river. At the end of the experiment, the material was taken to the expedition house of the Mozan/Urkesh Archaeological Project, in northeastern Syria, where Buccellati served then as Co-Director of the project.

In addition to visiting the Bouara salt playas, Buccellati and Hopkinson visited also the salt mines near Der ez-Zor and the salt playas of Palmyra and the Jabbul.

While Buccellati was responsible for the logistic organization of the trip, Hopkinson was entirely responsible for the intellectual scope of the project and for the coordination of the various phases of the experiment. Hence this report reflects essentially her thinking. She had also prepared the first draft of the text that is published here, but it was impossible to coordinate the final writing with her. The final redaction of the text is thus the work of Buccellati.

A short description of the experiment was published in Buccellati 1990 'Experiments.' The possibility that Qraya might have served specifically the purpose of providing northern cities with salt was presented at

length in Buccellati 1990 'Dawn,' and briefly mentioned in Buccellati and Kelly-Buccellati 2007 'Qurayya.' This proposal has been noted (e. g., Bernbeck 1993 *Steppe*), but has not been otherwise tested nor has it found general consensus. Goulder (2010 'Administrators' Bread' p. 357) refers to the proposal (but only on the basis of Buccellati 1999 'Urbanism' without considering the more detailed account in Buccellati 1990 'Dawn') and reports having done 'a brief experiment with wet salt precipitated from brine,' as a result of which 'the salt dried out well as the water soaked into the bowl, but then had to be scraped out with difficulty, with the damp BRB [Beveled Rim Bowls] again breaking when picked up': clearly, this result is contradicted by our own Qraya experiment as reported below *General historical and archaeological setting.*

The development of urban civilization in Syro-Mesopotamia (Figures 2 and 3), in the fourth millennium B. C., caused a radical re-alignment of social structures (Buccellati 2013 *Origini* ch. 5). In particular, a much larger demographic base resulted in the need to stock increased quantities of food supplies, the management of which required new expertise and favored the centralization of power in the hands of a small elite. Large storage facilities for dry food stuff give evidence of this. It is to be expected that salt would have played a role for the preservation of more perishable items like meat and fish. Sources of salt were as limited in antiquity as they are today, and thus any supply of this resource would have had to originate there.

A number of concomitant reasons suggest that the site of Qraya would have served to provide the northern cities of Syro-Mesopotamia, such as Tell Brak, ancient Nagar, with salt coming from the closest point of origin, in the area known today as Bouara. Qraya is the only site near Bouara which was inhabited in the fourth millennium, and it is located directly on the Euphrates river (Figure 4), which was the necessary presupposition not only for the processing of salt, but also for fishing, which would have yielded a by-product that could also be shipped north on the road along the Euphrates and the Khabur rivers.

A set of vessels that is typical for this early urban culture, the beveled rim bowls (Figures 5 and 6), present morphological traits that are similar to those of the ceramics from Bronze Age Europe known as *briquetage*, used in producing salt. The experiment reported below showed that indeed these vessels were ideally suited for the production of refined salt cakes, and they were part of a larger assemblage, each element of which was just as ideally suited for the complex production process that would have provided the northern cities with the salt supply they needed.

Figure 1. The authors at the Terqa Expedition house in Darnaj.
Here is where the Qraya artifacts were stored and the experiment was conducted.

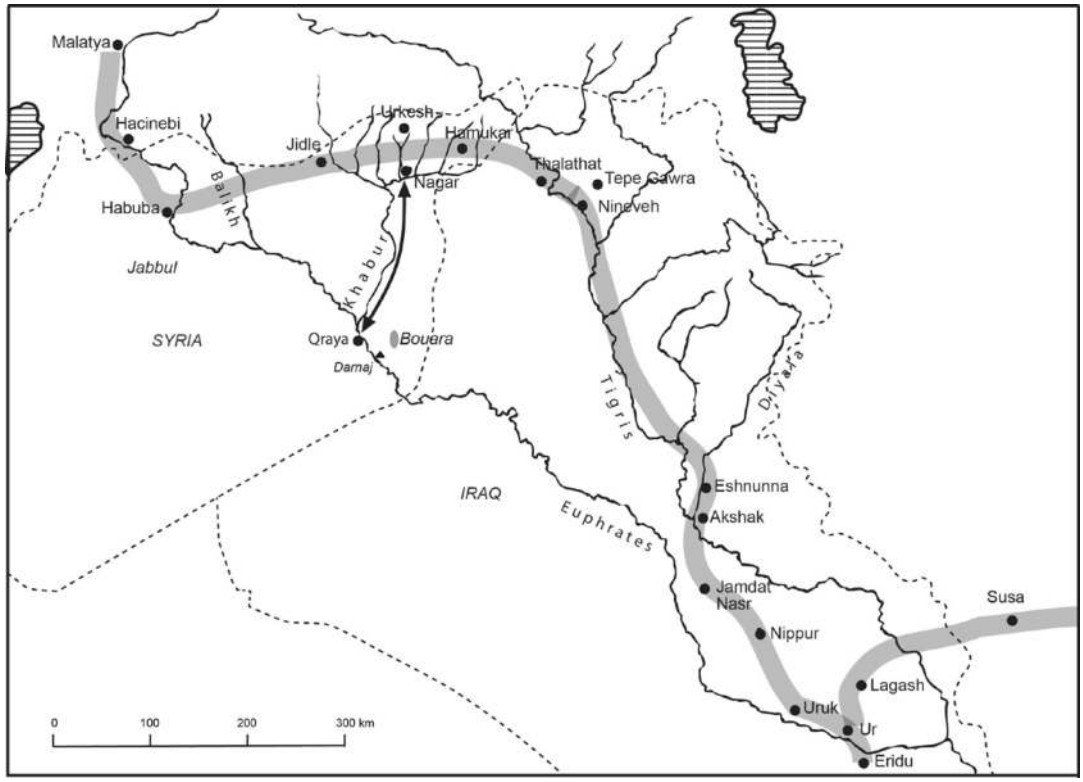

Figure 2. Syro-Mesopotamia with the major urban centers of the fourth millennium.
It is assumed that the Tigris was the main North-South artery of communication between urban centers. The small site of Qraya, which exhibits urban traits but is not a city, is assumed to have been created by the Northern cities for the specific purpose of exploiting the Bouara salt deposits, and of exporting both salt and cured fish from the Euphrates to the Northern cities.

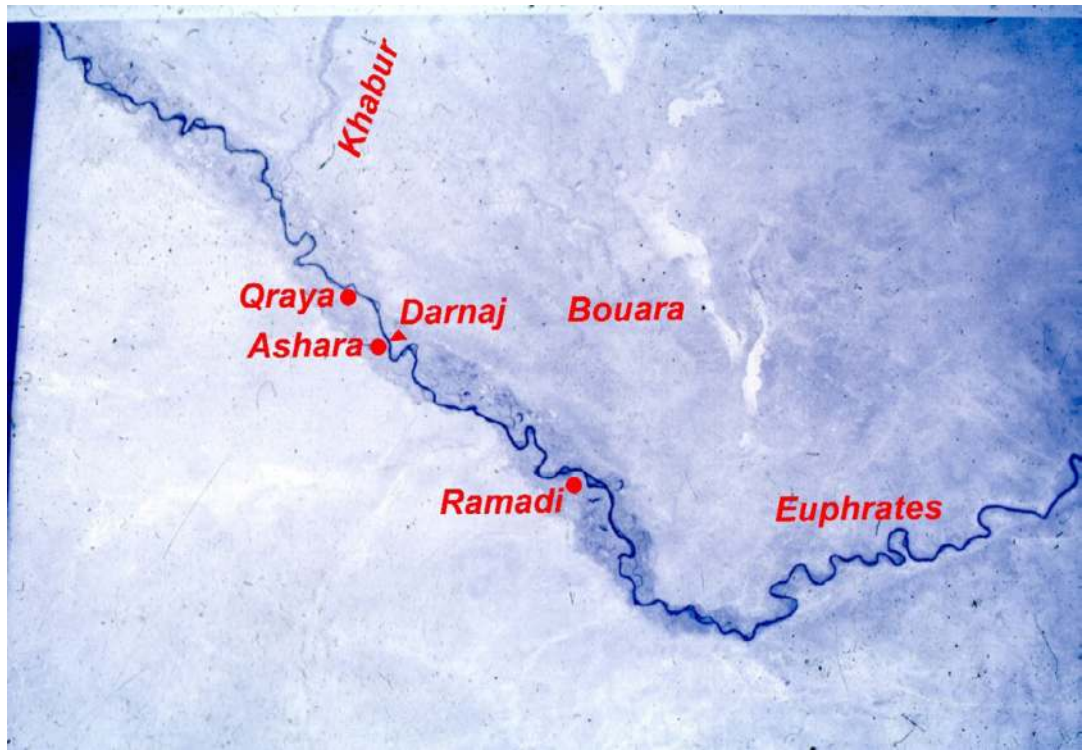

Figure 3. A satellite image of the middle Euphrates, with the location of relevant sites.
Qraya and Ashara (ancient Terqa) and Darnaj on the banks of the Euphrates, and the Bouara playas in the steppe.

Figure 4. An aerial view of Qraya, on the Euphrates.

Figure 5. A group of beveled rim bowls from Qraya.
The unevenness in size, as well as their presence in large quantitites in a non-urban site like Qraya argues against their serving as standards of measure for doling out rations.

Figure 6. A beveled rim bowl from Qraya.
The bevel along the rim comes from the fact that the vessel was made in a mold, which increased the speed with which they could be produced.

The beveled rim bowls

The major hypotheses for the use and function of the Beveled Rim Bowls suggest that they were used as grain measures (Nissen 1970; Johnson 1975; Nissen 1988; 2001), as bread molds (Schmidt 1982; Millard 1988; Potts 2001; Goulder 2010), for tax payments (Nicholas 1987; for a similar use of salt as tax revenue in the 11th century A. D. see Hopkinson 1995). There are difficulties with these interpretations, such as the existence of considerable variations in the actual size of the bowls (Beale 1978). But it is more than likely that, on given occasions, these bowls would have been used for all these purposes and more, as well as the one suggested here for salt production. One thing, however, distinguishes the salt hypothesis from the other ones: it seems clear that salt production could *only* have been effected through the use of these bowls. Such exclusivity does not apply in the case of the other proposals: a single standard vessel could have been used to measure quantities as they were being issued; bread could certainly be baked on flat surfaces; tax payments were in fact made with other means.

Porosity is a special characteristic of these vessels. A Sorptomatic 1990 Analysis Test was conducted on a sherd from a Qraya beveled rim bowl by Dr. Robert Jacobs at the Surface Analysis Facility, Research Laboratory at Oxford, in 2008, for this study. This BET analysis measures the voids that penetrate from the inner to the outer wall of the vessel, and he found on a microscopic level that this sherd was '*significantly porous,* with 36% open pores and an additional 6% or less, of closed pores,' making it ideal for rapidly absorbing liquid. At the macroscopic level, the pores varied in size up to about 80 Angstroms, which is at least four times the size necessary to adsorb Mg2 impurities that remain in solution after sodium chloride has crystallized, as described above in the draining and drying of salt. In addition, Dr. Walter Franke prepared thin sections in 2008, at the Hydrogeology Laboratory at the Freie Universitat, Berlin, on the same sherd. It was found to contain uneven inclusions of both large and small grains of quartz, feldspar, limestone, and volcanic fragments – inclusions that are found in the Euphrates river clay used at Qraya (Lease and Abdel-Rahman 2008 'Euphrates').

Bouara and salt sites in Syria

Three important Syrian salt sites were visited before proceeding with the Qraya experiments: Sabkhat al-Jabbul in the Aleppo governorate; Palmyra in the Homs governorate; and the Sabkhat al-Bouara in the Der ez-Zor governorate.

Al-Jabbul is the largest natural lake in Syria, located in a closed basin covering about 100 square kilometers. During the Pleistocene the basin overflowed and formed a tributary of the Euphrates. The lake is now relatively stable, flooding in the spring and shrinking in the summer and autumn, making it necessary to pump brine into an adjacent pond where the salt is crystallized by solar evaporation, producing large hard crystals of crude salt. When we arrived at the end of October, it was the end of the dry season in this semi-arid region, and it was raining. Crystallized salt had been heaped into large mounds for draining and was being hurriedly bagged by women for transport.

In Palmyra (ancient Tadmor**,** a historically renowned salt site) there is a salt patch that was, at the time, harvested privately under license from the government. The site where salt ponds are laid out was wind-swept (ideal for crystallizing salt), and floating around were delicate branches with lace-like agglomerations of salt formed by whirlwinds that testified to the ecology and salinity of the site. Long narrow groups of ponds were laid out in no particular order, facing different directions. They were about 8-12ft long and 4ft wide, making it easy to gather the salt from each side of the pond. The salt had already been gathered into small heaps to drain in some ponds, while in others it was in various stages of crystallizing. The grain was smaller than that we had seen at Jabbul, presumably because of wind conditions moving the crystals around while they were forming. The walls of the pond were about 1m high by 15-20cm thick, formed simply by heaping up soil to enclose the area and contain the brine for evaporation. A narrow ditch fed the ponds, presumably

by seepage from a spring that was not visible, and there were reservoirs. Heaping solar-evaporated salt is common practice world-wide, its main purpose being to drain the magnesium, boron and other soluble salts present, to improve the quality of the salt.

The third salt site we visited was Bouara, a vast inhospitable salt-encrusted flood plain, a desert plain that stretches out into the distance as far as the eye can see. We arrived there in October when the crude salt had mostly been gathered for the season and was awaiting transport. Because of the intense heat and high rate of evaporation, large grains of crystallized salt could be seen in the shallow waters of the lake that had a reddish-pink hue, similar to that seen in solar evaporating ponds that use seawater. As the concentrations of red halophytic bacteria (*artemia salina*) develop in the ponds, the brine increases in density and becomes red just before the salt begins to crystallize, and we concluded this is what we were seeing. To judge from the organization and loading equipment being used at Bouara to transport salt, the yield must be high. Large bags of salt were lined up in very long narrow strips across the desert, stacked six bags wide and six high, each bag probably weighing about one hundred pounds, awaiting the men to transfer them manually from the stack to the truck. In the forefront, a line of trucks stood by ready to be loaded. In yet another area, a mechanized loader was standing by, and on the 60km journey along the Ottoman Salt Way to Qraya, we drove past a line of fully loaded salt trucks. A bag of this salt was kindly given us by the Manager for use in our experiments at Darnaj, where our experiments took place.

A hydro-geological map clearly defines the mineral character of the salt sites (Paver 1947; Burdon et al. 1954, 385), illustrating the regional importance of these sites for producing salt. Although the mineral composition of the groundwater is not given precisely, it is sufficiently descriptive to determine the problems that might be encountered in refining the salt and can also be useful in assessing the function of the archaeological artifacts. Thus, in the elongated strip along the borders of Syria with Iraq, the saline waters of Bouara were found to contain 'water with much NaCl' where the yield of salt is high. Adjacent to this strip is a vast area that is also saline, but here the mineral composition was found to be high in $MgSO_4$ (magnesium sulfate) and C_aSO_4 (calcium sulfate), where it would not be economic to exploit for salt. The two great rivers, the Tigris and Euphrates, are also saline, with a mineral composition that again differs, containing 'much NaCl and $MgSO_4$,' where the yield and quality of salt would be less. Although the crude salt from Bouara had to be refined with water from the Euphrates, the magnesium sulfate it contained was easily removed by draining and drying in the process we describe below, while the salt saturation with NaCl would be increased.

The site of Qraya

Qraya is the name of a small village that sits atop a tell on a spur of land which juts out into the Euphrates (Figure 3). It is some 5km north of the town of Ashara, ancient Terqa.

Excavations took place from 1977-79, under the direction of Giorgio Buccellati and Marilyn Kelly-Buccellati, and then again in 1981 with Daniel Shimabuku as field director, and in 1984 with Steven Reimer as field director. They revealed an ancient settlement that was occupied sometime during the Ubaid and extensively in the Late Uruk period; was abandoned near the beginning of the 3rd millennium; and was reoccupied a millennium later in the Old Babylonian period (Reimer 1984; 1989; Simpson 1988, 44; see now also Shimabuku 2020 *Tell Qraya*, with the introduction by F. Buccellati). Although the evidence shows specific characteristics of an early urban site of the Uruk period, it was clearly not a city, because it is small in size and it lacks monumental architecture (Buccellati 1999 'Question').

A very large number of beveled rim bowls, intact and broken, was found, part of it discarded in a disposal pit about two meters in diameter and a meter and a half deep The rest of the inventory included spouted jars, trays and platters, bowls with a pouring lip, clay ladles, jar stoppers. There were also round clay grills which served as shelves on top of shallow open ovens. The nature of this assemblage is significant because it includes all the elements that are needed in the process of salt production as it was tested in our experiment.

The experiment

Overview

The goal of the experiment was to re-enact what we assumed to be the 'chaîne opératoire' that produced refined salt cakes from the crude salt layers at the Bouara playas. The material used in the experiment that was identical to that presumed to have been used in antiquity included (1) the crude salt, (2) the water from the Euphrates, and (3) the original beveled rim bowls: these were available in sufficient quantities so that their use in the experiment was felt to be acceptable. The other elements approximated those found in the assemblage, including the source of fire.

The goal was to test the quality of the refined salt produced and, therefore, the suitability of the beveled rim bowls and of the entire assemblage to obtain such results. (For a video presentation of the project see http://ethnosalro.uaic.ro/2016/03/interviews-with-prof-giorgio-buccellati-ucla/.)

Figure 7. Stage 1: Procurement. The Bouara salt playa. From the right: Buccellati, the manager, and Marwan Dabbagh, who took care of the logistics of the trip.

Figure 8. Stage 1: Procurement. The Bouara salt playa. Hopkinson on the right, with the manager of the playa.

Stage 1: Procurement

We traveled by car to the Bouara playas, which are at some 60km from Qraya, on an unpaved but well-marked track. The logistic arrangements were done by Mr. Marwan Dabbagh, who accompanied us (Figure 7), as well as a representative of the military, given the fact that we were going to an unmarked portion of the Syria-Iraq border. For its entire length, the track crosses a steppe landscape, with no settlements (Bernbeck 1993 *Steppe* p. 57 f.). The playa is clearly visible in the satellite image (Figure 2) because of its intense white color.

The salt can easily be gathered because of the presence of water that dissolves the salt. It is mixed with soil, which gives it a dark red color (Figure 8). We collected the salt in a cloth that was placed in baskets (Figure 9), which may have been the container of choice in antiquity as well. The distance between Bouara and Qraya could easily have been covered on donkeys in antiquity.

Figure 9. Stage 1: Procurement. Raw salt in a basket.

Stage 2: Purifying

Back at Darnaj (the expedition house of the Terqa project, on the banks of the Euphrates, where we were housed), we purified the crude salt through a double

Figure 10. Stage 2: Purifying. The water solution in two modern containers. The shallow bowl would presumably have been a larger vessel, like a basin (see Figure 12). The surface of the liquid and the transparent jar show the sedimentation of the impurities at the top.

Figure 11. Stage 2: Purifying. The water solution in two modern containers.

step. We first placed the crude salt in a bowl filled with water, which dissolved the solid block of crude salt. We then placed the resulting liquid in a jar (Figure 10), thus obtaining a purified brine that was fully concentrated with salt. When the salt dissolved, a red flocculant floated to the surface of the brine, and heavier particles of red earthy matter settled to the bottom, leaving clear brine in between (Figure 11).

The transparent jar shows the double sedimentation at the top and the bottom. The green jar imitates the shape of the ancient jar (Figure 13) in that the spout is place on the shoulder of the vessel, so that the central portion of the liquid (without impurities) would be poured out. This double procedure, for which we used metal and plastic containers, reflects the use of the ceramic vessels we find in the ancient assemblage. The large deep bowls or basins (Figure 12) would have been ideal for the initial step of liquefying, as it were, the salt blocks, while the spouted jars (Figure 13) would have served for the purification of the crude salt. This makes clear how perfectly suited the spouted jar shape would have been for this kind of double sedimentation, to the top and the bottom: the position of the spout is perfect for the clear brine to be poured out of the container. The two plastic vessels we used are obviously completely different from the originals, but in this case, it is the shape more than the ware of the ceramics that matters.

The purification process brought to mind the comment of the manager at Bouara, who said something to the effect that this had been 'a bad year because of the wind.' He was indicating that when the wind blows red earth from the surrounding area onto the salt flat, as it did in that particular year, it affects the degree of pollution, hence causing a bad year in terms of the yield of salt. And it was this need to separate out the earthy

Figure 12. Stage 2: Purifying. The ancient deep bowl or basin from Qraya, with a small cup for pouring.

Figure 13. Stage 2: Purifying. Two ancient spouted jars from Qraya.

impurities from the brine for which the spouted jars in the assemblage were useful. They allowed the surface flocculant to be poured off first (perhaps into one of the lipped bowls, or a jar), in order to use the clear brine below for boiling, being careful not to let the remaining sediment at the bottom mix with the clear brine. It was a meticulous process carried out by practiced salt-makers who thus were able to produce a much better quality of salt that would be more valuable in the market place.

Stage 3: Boiling

The clear brine was then boiled in shallow bowls or high-rimmed platters. We placed it in a metal pan (Figure 14), of roughly the same size as the ancient one (a sherd of which is shown in the picture). We placed this in turn on a clay grill (Figure 15), which approximates those found in the excavations. The fire came from a butane gas tank.

The thickness of the sherds of the ancient platters (Buccellati 1990 'Dawn' Plate 6c) has been somewhat perplexing as ordinarily this would detract from the heat of the fire. However, designed as they were to cap the grill, the amount of heat might be right for boiling. The platters are smooth on both the interior and exterior and were fired at a higher temperature making them suitable for boiling.

Figure 14. Stages 3 and 4: Boiling and drying.
As the salt crystallizes from boiling, it is gradually scooped out and placed into the beveled rim bowls on the edge of the grill, where it dries out evenly. The sherd is from an ancient shallow bowl or platter where the boiling would have occurred.

Figure 15. Stages 3 and 4: Boiling and drying.
A modern ceramic grill similar to the ones found in the excavations at Qraya.

At a certain point in the boiling process, the top of the brine surface was instantly transformed into a pure white crystalline texture. We did not, unfortunately, at the time have a video camera to record this extremely sudden transfiguration of the surface of the brine.

Stage 4: Drying

As the crystals formed, they were removed with a ladle or wooden spatula and placed in the beveled rim bowls, on the edge of the grill (Fig. 14; for a picture of an ancient grill from Qraya see Buccellati 1990 'Dawn' Plate 6b). Clay ladles are present in the ancient assemblage (Buccellati 1990 'Dawn' Plate 7a), and the beveled rim bowls used were, of course, the original ones. The purpose of this final step was to allow the brine to drain and then to dry. While the process continued, small amounts of brine were continually added to the boiling pan and to the beveled rim bowls, to make the most of the fuel and the heat of the fire. The porosity of the beveled rim bowls as well as their shape make them ideally suited for this process, in terms of both draining through the walls of the vessels and desiccating evenly through the progressively wider exposure at the top away from the direct fire.

Since water from the Euphrates was used to dissolve the crude salt, minerals contained in that water would add additional sodium chloride, as well as magnesium sulfate (Epsom salt), to the crude salt from Bouara. However, the magnesium sulfate is more soluble, still in solution when transferred to the BRB, and would be absorbed by the pot as described above.

The importance of the boiling and drying stages cannot be underestimated. The special nature of the beveled rim bowls could deal with the issues related to the hygroscopic properties of salt, as well as its taste. This is accomplished by dissolving impure salt in water to produce a brine solution that is boiled to allow for the removal of impurities (brine is classified as being any salt solution that is more concentrated than seawater that contains 3.5% dissolved mineral solids, of which 2.9% is sodium chloride). This is fortuitously made possible because mineral salts precipitate out of a saline solution sequentially in the order of their solubility, allowing them be removed before they mix with each other (O'Brien et al. 2005 *Chlor-Alkali*, 7.2.2). To achieve this, the volume of brine is reduced by the boiling process until it reaches 53% of its original volume. At this point, the *least* soluble minerals like the stony calcium salts (as the salt makers liked to describe them), precipitate. Differentiated from common salt in appearance, they can be removed from the pan before sodium chloride begins to crystallize, and this occurs when the volume of brine has been reduced to 19% of its original volume. If, at this point, the wet sodium chloride crystals are *not* removed from the pan when the brine solution reaches 4% of its original volume, the NaCl will mix with the more soluble minerals - the

Figure 16. Beveled rim bowls with salt cakes produced during the experiment.

magnesium and potassium bromides and chlorides known as the bittern, making the salt unpleasant to the taste. But if they *are* removed and transferred to a porous *briquetage* type vessel, the remaining salts still in solution will be absorbed, and will precipitate on the *outside* of the vessel, thus removing them from the salt, a quite ingenious and very simple method of refining, leaving the salt inside the pot purer.

It may be noted that, in solar evaporation, refining is handled by using a series of ponds where brine is moved from pond to pond leaving behind the less soluble mineral impurities that precipitate before sodium chloride. The more soluble impurities are more difficult to handle, as the weather mainly controls the process. In this case, crude salt gathered from the ponds is usually left in large stacks to drain, sometimes for as long as a year or more. And depending on how the salt is to be used, it is still considered crude salt that requires further refining (washing with a weak brine) if it is to be useful in one way or another.

Conclusions

Uses

In a few hours we were able to produce a considerable quantity of pure salt cakes (Figure 16). Clearly, great quantities of salt could be produced in antiquity, and the question arises as to the use to which they could have been put. The ancient settlement at Qraya was, we saw, very small and without any of the traits distinctive of an urban center. On the other hand, the general set-up of the remains found in the excavations, and the sheer quantity of beveled rim bowls, indicate a large scale activity hardly in keeping with the needs of a small village.

For this reason, we have suggested (Buccellati 1990 'Dawn') that the site was an outpost established specifically to provide the northern cities of the Protoliterate period with salt in the first place, and also with fish, which was plentiful in the Euphrates, but not available in the plains of the 'upper country.' What is significant about this is that the entire commercial network would have been initiated and then managed by the cities in the north, without any previous local expertise or even knowledge of the potential of salt production. It was not a regular trade exchange, neither symmetrical nor asymmetrical. It was rather an endogenous production activity, i. e., one started and managed by the recipients of the goods, the cities in the north.

To extract the salt cake from the beveled rim bowl, one could hit the base of the upturned vessel (Figure 17), which would neatly break the bowl in two (Figure 18). This singular breakage pattern, along the longitudinal axis of the bowl, can be noted frequently in the sherds of the bowls found in ancient discards, and can only be attributed to an intentional act.

The salt was then readily accessible for salting fish, such as the catch we photographed when a fisherman happened to pass by our working station on the edge of the river (Figure 19). The fish, salted for preservation, could then be shipped to the northern cities.

How successful early salt makers were in preserving food with impure salt is unknown, although in antiquity the task of obtaining a better quality of salt for preserving different kinds of food was

Figure 17. Breaking the bowl to get a complete salt cake.
Hitting the base of the upturned bowl causes it to crack open, leaving the salt cake intact. The unusual longitudinal breakage pattern is often found in the discards in the excavations.

Figure 18. Detail of the bowl cracked open.

Figure 19. A fisherman with a fresh catch.
The photo is taken at the Expedition house in Darnaj, on the eastern side of the Euphrates, where the experiment took place. The site on the opposite side of the river is Ashara, ancient Terqa.

no doubt made easier by exploiting salt resources that were relatively purer, or at the very least contained fewer mineral impurities that could be recognized by color and taste. Impure salt was, and still is, frequently gathered worldwide by tribal communities, either for their own consumption, or for their animals. Only when the need arose to preserve and store larger quantities of seasonal food did the parameters for purity become more stringent. As humans moved beyond the subsistence stage, they learned the survival value of preserving and storing surplus food to guard against periods of famine. In Mesopotamia as elsewhere, fish was a major source of food, but it rots quickly and needs to be preserved in some way if it is intended for future use. The methods used in antiquity in a given area can nevertheless be reconstructed not only from the ecology of the site, and the ethnographic evidence, but also from the kind of fish available for salting. Salt containing 4.7% magnesium chloride will turn fish putrid before it is fully preserved, particularly during the first two days when fish are most susceptible to bacterial attack. But the standard of purity required varies according to the muscle and oil content of the fish that can exhibit a noticeable change if only l% magnesium and calcium salts are present. Although 2% magnesium is not an ideal level, this amount was found acceptable by the trade because common salt is generally expected to contain this amount of impurity (F. W. van Klaveren and R. Legendre in Borgstrom 1965 Fish Vol. 3, p. 134). All fish muscle is a mixture of water, fats, sugars, salts, and solids (both soluble and insoluble), are affected by temperature, which influences the methods that can be successfully used to preserve fish (A. C. Jason in Borgstrom 1965 Fish Vol. 3, p. 15), and the type of drying process that will succeed. For example, salt herring keeps better than smoked herring, because the physical barrier to fat oxidation presented by complete submersion in brine is thought to be more effective than the chemical barrier provided by the phenolic antioxidants absorbed from wood smoke (C. L. Cutting in Borgstrom 1965 Fish Vol. 2, p. 14).

Shipping of salt

The salt itself would also be shipped, and the inference is that this would be done using the beveled rim bowls themselves. This would explain the quantity found in the northern cities, and would also allow for them to be reused in a number of different ways.

At first, the notion that beveled rim bowls would be used to ship salt cakes over the considerable distance that separates Qraya from the northern cities (more than 200km) seemed to pose a difficulty: why use such heavy containers for such relatively small quantities of salt? The answer came, unexpectedly, from a chance discovery. In addition to the beveled rim bowls, an ordinary pottery bowl had also been used in our experiment, to compare results. At the end of the experiment, all the vessels in which salt cakes had been produced were taken to the expedition house at Tell Mozan, ancient Urkesh, where Buccellati was at the time co-directing an excavation project. The vessels were stored side by side in the expedition house. Upon returning the following summer, we discovered that the state of preservation of the salt content was sharply different: the walls of the ordinary bowl had completely disintegrated, and the salt had become unusable, while those of the beveled rim bowls had remained in perfect condition and the salt remained in its pristine condition. Figures 20-21 show the two types of bowl side by side, and Figures 22-23 a close-up of each type. The salt in the beveled rim bowls remained in the same condition for several years. Clearly, the cost of the extra weight was necessary to ensure the quality of the product and preserve it for the long haul.

The phenomenon may be explained as follows. The salt stored in the beveled rim bowls kept dry, as moisture from the air was able to evaporate through the open pores of the pot, maintaining the stability and texture of the salt by keeping it dry. The salt stored in the two impervious and more highly fired pottery bowls totally disintegrated, with red particles of the pot mixing with and contaminating the salt. Less porous than the beveled rim bowls, the moisture from the air that was absorbed by the salt in the ordinary ceramic bowls was not able to evaporate and keep the salt dry, and acids in the clay pot reacted with the salt and became corrosive,

Figure 20. Stored salt a year later.
The salt in the beveled rim bowl is in perfect condition, whereas the salt cake produced in an ordinary ceramic vessel has caused the ceramics to crumble.

Figure 21. Detail of the two vessels with stored salt.

Figure 22. Detail of salt stored in the beveled rim bowl.

Figure 23. Detail of the ordinary vessel in which salt was stored.

attacking the clay and causing the pot to disintegrate. Soluble salts respond to both high and low changes in humidity that changes them from a solution to a solid and back, damaging the surface of the ceramic as salt crystals and liquid salt, respectively, expand and shrink within the ceramic body. And over time, the physical components of the body will crumble until completely destroyed (Little 2000 Winterthur Guide, p. 61), as was the case with the vessels stored in the Mozan expedition house. The need to drain and thoroughly dry salt may thus have been the primary reason for developing the beveled rim bowls in the first place. This was due to the hygroscopic nature of salt and its propensity to dissolve from moisture in the air. It can absorb 0.5% of moisture at ordinary room temperature and lose as much as 25% of its bulk when being transported, or while being stored. Where salt contains the more soluble mineral impurities like the chlorides and sulfates of magnesium and potassium, that are more soluble than salt, it becomes even more susceptible to losing its granularity, partially dissolving, affecting its granular texture and becoming a homogenous lump that cannot be dispersed evenly over food that is being preserved or consumed. Fine-grained salt produced by boiling fast is required if it is to be thoroughly compacted and molded in briquetage type pottery to protect it from moisture in the air. Certainly, these highly porous salt molds were ideal for rapidly absorbing water in order to compact the salt, and when thoroughly dried, it was found that the salt compacts even further. The resulting solid cake of salt is then more stable and more resistant to dissolving from moisture in the air while in storage and during transport. And as briquetage was not flammable, the mold could be placed close to the fire for drying.

Results

The advantage of the *briquetage* process was that it produced a refined salt of a higher quality, which was more useful than raw and impure salt in a number of ways. Besides protecting the salt during transport and storage, it would have had greater value in the market place, either in terms of preserving food, or for use as currency in barter and exchange. Its very shape and color was an indicator of its quality, and the fact of being 'packaged' in a beveled rim bowl would have served as a trademark of sorts.

The experiment shows convincingly, in our opinion, that the hypothesis of a complex salt production process at the dawn of history, as described here, is plausible. The following major points emerge from the argument we have developed:

The beveled rim bowls were ideally suited for producing high quality salt, while other vessels would not have worked.

1. As reconstructed by us, the beveled rim bowls were used at the end of a specific *chaîne opératoire*, which utilized a number of the items present in the whole inventory or assemblage excavated at Qraya – basins, spouted jars, high rimmed platters, ceramic ladles, ceramic grills.
2. Such a functional distribution in the use of specialized vessels at a site like Qraya, with no large scale administrative set-up, can best be explained as documenting a production center specifically designed to serve the needs of the large cities to the north.
3. The location of the site was ideally chosen for the intended process, being as it was the shortest distance from the playas of Bouara and directly on the shores of the Euphrates river, which provided all the fresh water needed for the production process.
4. The same location also made it possible to catch large quantities of fish and prepare them for shipping to the north, having been first appropriately cured with the salt that was immediately available for the purpose.
5. The overall procedure presents us with a unique type of resource exploitation, in three ways. First, instead of a pre-existing local salt production expertise, we may more likely assume that the process originated with the consumers, i.e., the cities in the north that would have installed the whole process from the outside.
6. Second, the production method evinces a sophisticated system of controls, which entails a well-honed set of skills and the awareness of properties that are not immediately apparent and require considerable training to be maintained.
7. Third, this can be seen as a type of industrial activity, in the sense that the commercial network behind it consists of a number of intermediate steps where each individual involved is not necessarily aware of the overall sequence (Buccellati 2013 *Origini*, 5.12; 6.2).
8. The specific suitability of the beveled rim bowls as quality-identifiers for shipping and storage explains the large number of these vessels found at great distances from the original place of production.
9. Finally, while the vessels employed are ideally suited for salt production, and the experiment showed that they would have so functioned, they could and would, of course, be used for a variety of different purposes.

The conclusion to which we have arrived is thus significant for a better understanding of both the history of salt and the archaeology of early Syro-Mesopotamia.

With regard to the history of salt, we see how it played a major role at a very beginning of urban

life, around 3500 B. C.: a complex technology was mastered capable of producing truly high quality salt that would rival any we can produce today. This was suited for the purposeful strategy behind gathering large quantities of perishable food, which is a hallmark of early urban society. In the case of meat, the strategy was possible if it was known that large caches of it could be preserved for future use. Sufficient salt had to be made and kept in storage to accommodate seasonally surplus food as it became available, particularly over the vast area in which the beveled rim bowls are found.

With regard to archaeology, the experiment supports the hypothesis that a particular and ubiquitous type of vessels, the beveled rim bowls, would have been produced for a very specific purpose. This purpose accommodated so many specific technical requirements and worked in such synergy with the rest of the evidence as to make it inconceivable that it might have been just accidental. It goes without saying that successive multi-tasking would have been the rule of the game; but for no other such task can we say that other vessels would have been as uniquely suited as for the task for which our experiment has shown these vessels to be perfectly suited.

References

Beale, T. W. 1978. Bevelled-rim Bowls and Their Implications for Change and Economic Organization in the Later Fourth Millennium. *Journal of Near Eastern Studies* 37: 289-313.

Bernbeck, R. 1994. *Steppe als Kulturlandschaft. Das Agig-Gebiet Ostsyriens vom Neolithikum bis zur islamischen Zeit*. Berlin, Dietrich Reimer.

Borgstrom, G. 1962. *Fish as Food* 2. *Nutrition, Sanitation, and Utilization*. New York and London, Academic Press.

Borgstrom, G. 1965. *Fish as Food* 3. *Processing*, Part 1. New York and London, Academic Press.

Buccellati, G. 1990. Experiments in Salt Production at Qraya. *Syrian Archaeology Bulletin* 32: 9-10.

Buccellati, G. 1990. Salt at the Dawn of History: The Case of the Beveled Rim Bowls. In P. Matthiae, M. Van Loon and H. Weiss (eds.), *Resurrecting the Past. A Joint Tribute to Adnan Bounni*, Publications de l'Institut historique-archéologique néderlandais de Stamboul 67: 17-40. Leiden, Nederlands Historisch-Archaeologisch Instituut te Istanbul.

Buccellati, G. 1999. Urkesh and the Question of Early Human Urbanism. In M. Hudson and B. A. Levine (eds.), *Urbanization and Land Ownership:* 229-250. Cambridge, Peabody Museum of Archaeology and Ethnology, Harvard University.

Buccellati, G. 2013. *Alle origini della politica. La formazione e la crescita dello stato in Siro-Mesopotamia.* Milano, Jaca Book.

Buccellati, G. and Kelly-Buccellati, M. 2007. Qurayya, Tall. *Reallexicon der Assyriologie und vorderasiatischen Archäologie* 11, 3/4: 206-207.

Burdon, D., Subhi, J. M., and Safadi, C. 1954. Groundwater in Syria. In *Union géodesique et géophysique internationale. Association internationale d'hydrologie scientifique. Assemblée générale de Rome 1954*. Tome II: *Comptes-Rendus et Rapports de la Commission des Eaux Souterraines* 37: 377-388.

Forest, J.-D. 1987. Les bevelled rim bowls: nouvelle tentative d'interprétation. *Akkadica* 53: 1-24.

Hopkinson, B. 1995. Salt and the Domesday Salinae at Droitwich, AD 674-1690: A Quantitative Analysis. *Transaction of the Worcestershire Archaeological Society*: 1-58.

Johnson, J. A. 1975. Locational Analysis and Uruk Local Exchange Systems. In J. A. Sabloff and C. C. Lamberg - Karlovsky (eds.), *Ancient Civilization and Trade:* 304-305. Albuquerque.

Lease, N. A. and Abdel-Fattah M. A.-R. 2008. The Euphrates Volcanic Field, Northeastern Syria: Petrogenesis of Cenozoic Basanites and Alkali Basalts. *Geological Magazine* 145: 685-701. Cambridge University Press.

Little, M. 2000. *The Winterthur Guide to Caring for Your Collection*. Hanover and London, University Press of New England.

Millard, A. R. 1988. The Bevelled-Rim Bowls: Their Purpose and Significance. *Iraq* 50: 1-3.

Nicholas, I. M. 1987. The Function of Bevelled Rim Bowls: A case study at the TUV Mound at Tal-E Malyan, Iran. *Paléorient* 13: 61-72.

Nissen, H. 1970. Grabung in den Quadraten K/L XII in Uruk-Warka. *Baghdader Mitteilungen* 5: 137.

Nissen, H. 1988. *The Early History of the Ancient Near East, 9000-2000 BC*. Chicago (IL), University of Chicago Press.

Nissen, H. 2001. Cultural and Political Networks in the Ancient Near East during the Fourth and Third Millennia. In M. S. Rothman (ed.), *Uruk Mesopotamia and its Neighbors: Cross Cultural Interactions in the Era of State Formation*: 167. Santa Fe, SAR Press.

O'Brien, T. F., Bommaraju, T. V. and Hine, Fumio 2005. *Handbook of Chlor-Alkali Technology*: *Fundamentals.* New York, Springer.

Paver, G. L. 1947. Water Supply in the Middle East Campaigns – VII, Syria & Lebanon. *Water and Water Engineering* 50: 61-76.

Potts, D. 1984. On salt and salt gathering in ancient Mesopotamia. *Journal of the Economic and Social History of the Orient* 27: 225-271.

Potts, D. 2001. Bevel-Rim Bowls and Bakeries: Evidence and explanations from Iran and the Indo-Iranian Borderlands. *Journal of Cuneiform Studies* 61: 1-23.

Reimer, S. 1984. *Tell Qraya. A Summary of the 1984 Season*. Online at www.terqa.org.

Reimer, S. 1989. Tell Qraya on the Middle Euphrates. In M. Rothman (ed.), *Out of the Heartland: The Evolution of Complexity in Peripheral Mesopotamia during the Uruk Period = Paléorient* 15: 284.

Schmidt, K. 1982 . Zur Verwendung der mesopotamischen 'Glockentopfe'. *Archäologisches Korrespondenzblatt* 12: 317-319.

Shimabuku, D. 2020. *Tell Qraya on the Middle Euphrates. Final Report of the 1981 Season*. Terqa Final Reports 4. Bibliotheca Mesopotamica 34. Malibu, Undena Publications.

Simpson, K. 1988. *Qraya Modular Reports, No. 1: Early Soundings*. Syro-Mesopotamian Studies 4/4. Malibu, Undena Publications.

Research on the Use of Hallstatt's Stone Axes: Study of Mechanics

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Abstract

Various stone axes, stone axe-hammers and fragments of polished stone tools have been been found in the vicinity of the Hallstatt salt mines. We have analysed 15 stone axes (11 from the Hallstatt Museum and 4 from Naturhistorisches Museum Wien) and compared the traces of use with those of the axes found in the Vall Salina of Cardona. The analysis show that these stone tools can be separated into three groups: axes that were used to hit a hard material such as rock salt, axes that were used to hit soft materials and axes that might represent prestige objects.

Keywords: Cardona, Hallstatt, mining tools, Neolithic, Stone axes.

Introduction

Hallstatt (Upper Austria, A) is situated in the Northern Calcareous Alps (Figure 1A). The ancient mining town sits on the southwest bank of Lake Hallstatt, which is enclosed by the steep ranges of the Dachstein massive except for its northern end.

The Hallstatt Salzberg Valley is located 400 m above the town on the western slope of the solid calcareous of mount Plassen (1953 m). It stretches between 800 and 1400 m asl. All prehistoric and historic salt mining activities until the 1960s were located in this narrow valley (Barth 1986) (Figure 2A). The valley is characterized by a pronounced slope -27%- (Figure 2B) and can only be directly accessed via the steep slope of the Hallberg (gradient of 78%).

The existence of stone axes in the Hallstatt area (Barth 1987; Leutner and Ritinger 1983; Morton 1966, 1984 and 1995; Reschreiter and Kowarik 2009 and 2010; Stöllner 1996; Stöllner and Thomas 2015; Unterberger 1981) and, above all, the find of an antler peak in a mining gallery (*Kaiser-Josef-Stollen*), indicate human presence and have initiated a debate on salt mining during the Neolithic (Barth 2009: 14; Kowarik and Reschreiter 2009: 47; Reschreiter and Kowarik 2009: 44). But the presence of these objects does not represent definitive evidence for salt mining. As these finds could result from a broad spectrum of activities such as timber work, working on wood, construction works and so on. Even the evidence of the antler pick is ambiguous. The object was found inside a modern mining gallery but very close to the mine entrance. Two likely scenarios exist. Either the antler pick represents a mining tool and represents an *in situ* finding, or it was used on the surface and transported into the mine through a land slide. Thus the fact remains that, in the current state of affairs, certain evidence for salt exploitation in general and underground salt mining in particular in Hallstatt is only available from the Middle Bronze Age onwards.

Therefore in 2014 a study of those lithic tools was started with the aim of gaining detailed insight into their function. Use wear analysis and morphology were studied on 15 of the 27 known stone axes from the Hallstatt area (11 from the Hallstatt Museum and 4 from the NHMW). The rest of the collection is dispersed over different museums (e.g. Landesmuseum Kärnten, Archäologische Staatssammlung München).

The communication that we presented in the First International Congress on the Anthropology of Salt is a preliminary result. We discuss the spatial context of the finds as far as documented, the analysis of the mechanics and of the use wear marks and aspects of the chronology.

The Neolithic record of Hallstatt

Secure information about Neolithic activities in Hallstatt is scarce. Amongst it count the antler tip with a radiocarbon date of around 5000 BC, which places it at the end of the early Neolithic / beginning of the middle Neolithic (Reschreiter and Kowarik 2009: 44; Kern 2010: 83). Also an axe fragment from Hallstatt-Friedlfeld was observed in its archaeological context (Stöllner 1996). Typochronologically this fragment could be situated between the *Südostbayerische Gruppe* (5000-4500 BC) and the *Münchshöfener Gruppe* (4500-3800 BC) (Stöllner 1996: 134) (Figure 1B, C, D, E). The typology of the axe documented by Stöllner is the same

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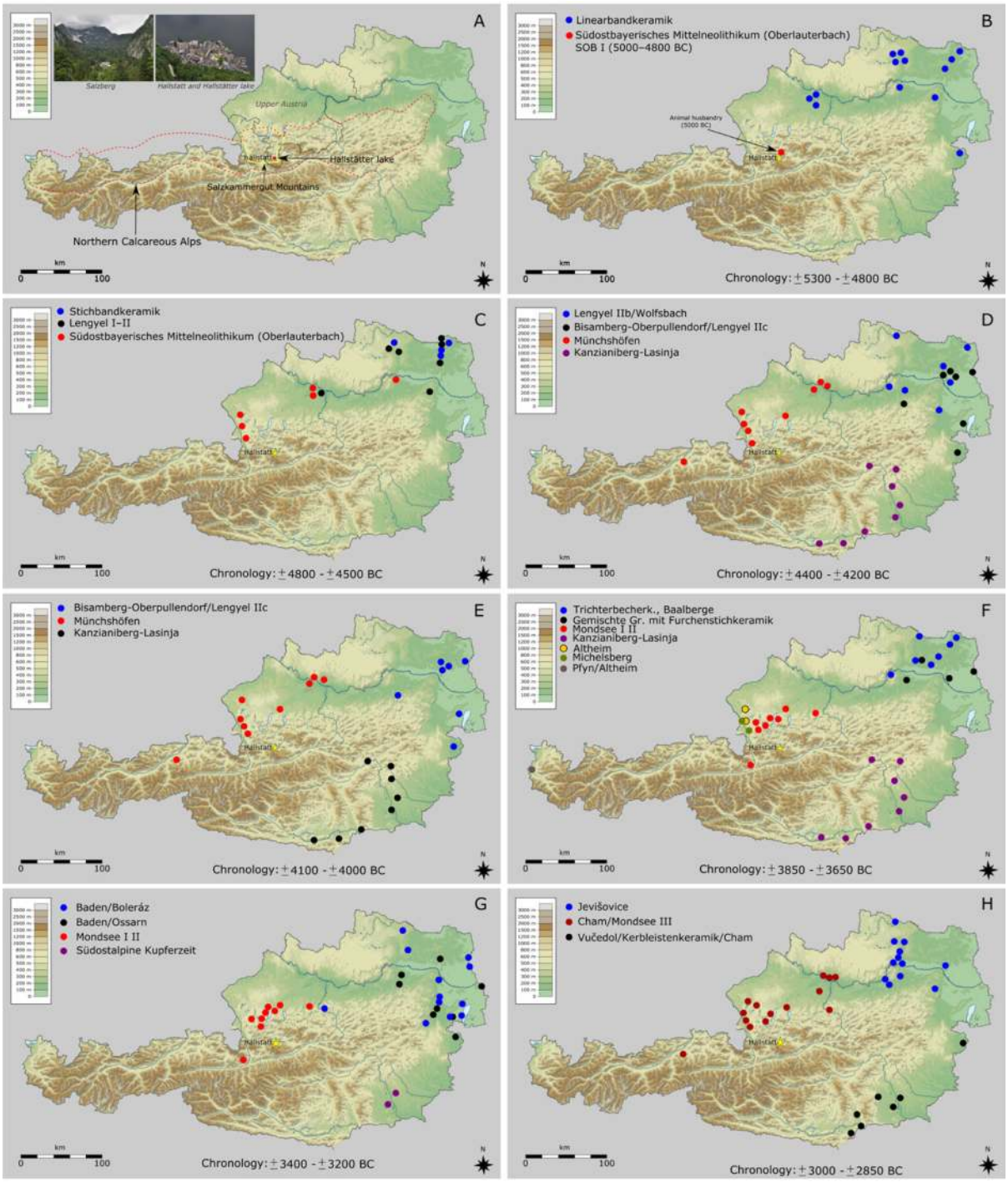

Figure 1. (A) Topographic Map of Austria. (B) Map of the distribution of archaeological sites in Austria. Chronology: ±5300 – ±4800 B.C. (C) Map of the distribution of archaeological sites in Austria. Chronology: ±4800 – ±4500 B.C. (D) Map of the distribution of archaeological sites in Austria. Chronology: ±4400 – ±4200 B.C. (E) Map of the distribution of archaeological sites in Austria. Chronology: ±4100 – ±4000 B.C. (F) Map of the distribution of archaeological sites in Austria. Chronology: ±3850 – ±3650 B.C. (G) Map of the distribution of archaeological sites in Austria. Chronology: ±3400 – ±3200 B.C. (H) Map of the distribution of archaeological sites in Austria. Chronology: ±3000 – ±2850 B.C. Map created from DEMIS Mapserve (Creative Commons (CC)) and transformed by: Alfons Fíguls i Alonso. The distribution of archaeological sites: Buchvaldek, et al. 2007, 7-13. Photos: Alfons Fíguls i Alonso.

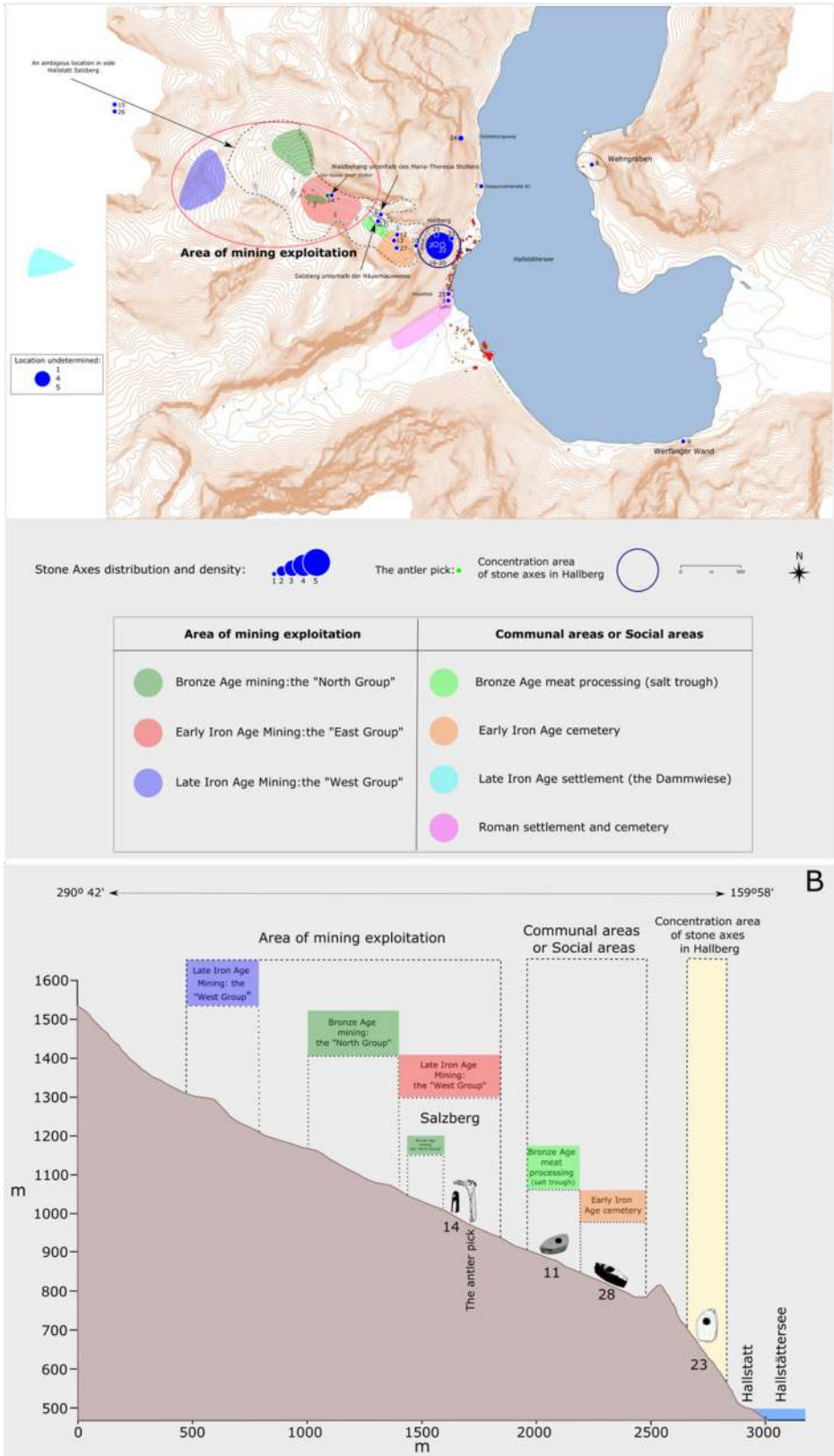

Figure 2. (A) Distribution of archaeological finds from in around Hallstatt, and in particular from the High Valley. (B) Topographic cross section of the High Valley. Distribution of archaeological finds. The numbers that appear in the stone axes correspond to the number of Table 1. Cartographic information: Land Oberösterreich, Abteilung Geoinformation und Liegenschaft (http://www.land-oberoesterreich.gv.at/119798.htm). Geographic information system (GIS): QGIS

as the fragment of the axe number 15714 (Museum Hallstatt) found in Hallstatt-Lahn in proximity to the one presented by Stöllner. In 1965, one of the houses at the northern end of the town of Hallstatt was destroyed by rock fall. During the following construction work, a big axe was found (MH 18507) and a bone needle that, according to F. Morton, might be dated to the Neolithic (Morton 1966: 161). In addition three stone axes in the form of *Schuhleistenkeile* are known. Chronologically the *Schuleistenkeil*-form is strongly correlated with the early Neolithic *Linearbandkeramik* culture (5700-4900 BC), but was also in later periods. For the other pieces no information about the archaeological context exists. Their classification as Neolithic (Stöllner 1996: 149-150) is based on the sole fact that they are made of stone. But it is necessary to bear in mind that those axes are not exclusively restricted to the Neolithic era (Donnart et al. 2012; Hamon 2007; Král et al. 2015; Maluquer de Motes 1980; Ortiz 2004). We would like to thank Fritz-Eckart Barth for the use of his site database for the Hallstatt area.

The 27 stone axes from the Hallstatt area are spread over a radius of 2.5 km around the town of Hallstatt. Nine have been found in the area of Hallstatt-Salzberg, nine in the Hallberg area, two at Hallstatt-Lahn, two on the western shore of the lake, one in the area of Werflinger Wand (southern shore of the lake) and one at Wehrgraben (eastern shore). Three pieces could not be attributed (Figure 3). The typological spectrum covers perforated axes (13), flat axes (6), axes (5) and adzes (so called *Schuhleistenkeile*, 3).

The Hallstatt stone axes: functional analysis

Stone axes were of essential importance for Neolithic communities as tools for deforestation, wood working and construction work (Lammers-Keijsers 2008; Orozco-Köhler 2000; Pétrequin and Jeunesse 1995; Pétrequin and Pétrequin 1988; Pétrequin and Pétrequin 2002; Piel-Desruisseaux 1989 and 2001; Risch and Martínez 2008; Semenov 1981). Polished stone axes are multifunctional tools. They can be employed for a broad spectrum of activities from wood working to slaughtering animals (Pétrequin and Pétrequin 2002: 72-75), and also as mining tools as documented, e.g. at the Vall Salina of Cardona (Fíguls et al. 2010 and 2011, Weller and Fíguls 2013).

They have also been shown to be of importance in the social and ritual sphere as prestige objects (Pétrequin and Pétrequin, 2006). There are some cases where stone axes were used as a wedge in a secondary function (Lammers-Keijsers 2008: 42).

In order to determine the functional context of the lithic tools found in Hallstatt step use wear analysis an analysis of morphological aspects were conducted on 15 of the Hallstatt stone axes in a first step. The objects were classified according to the following criteria: morphology, point shapes, use wear, working angle, angular shift, and length of arc. The typometric characteristics are shown in table 1; for an overview of the forms see Figure 3.

Use wear analysis focused on the morphology, extent, intensity and distribution of the use marks on each active surface. Fragmentation modes were considered as well. The analysis was performed both macroscopically and microscopically. A binocular microscope (10× to 40×) was used.

When working with a stone axe, energy is transferred to the axe in order to displace it. When this movement is stopped by a static force, a deformation of the stone head occurs. The total penetration length that an object can achieve in a specific material is inversely proportional to the hardness of the material and to the cross-sectional area of the object (Fíguls and Bonache 1997). That is, the lithic percussion tools are elastic up to a certain degree of received force, but if this force exceeds a threshold level, the deformation becomes irreversible. Wood produces irreversible deformations on stone axes (roundness of the cutting edge, for example). If the hardness of the material being worked with the stone axe increases, the forces acting on the axe increases as well as resulting in stronger (and more) irreversible deformations. Thus, the traces of use and wear and/or the fragmentation pattern give indications about the material that the stone axe was used on (Fíguls 2013).

Here we present a first approach, where we establish three different categories:

Surface types	Deformation of active surfaces
1 - Relatively hard surfaces	Cutting edge: thick, dented, deformations are distributed uniformly over the active surface
2 - Hard surfaces	Cutting edge: thick, tends to a regular form Chips: • Size: small • Shape: smooth and irregular
3 - Very hard surfaces	Tend to an irregular form, thick edge Chips: • Size: big and small • Shape: irregular, smooth and additions

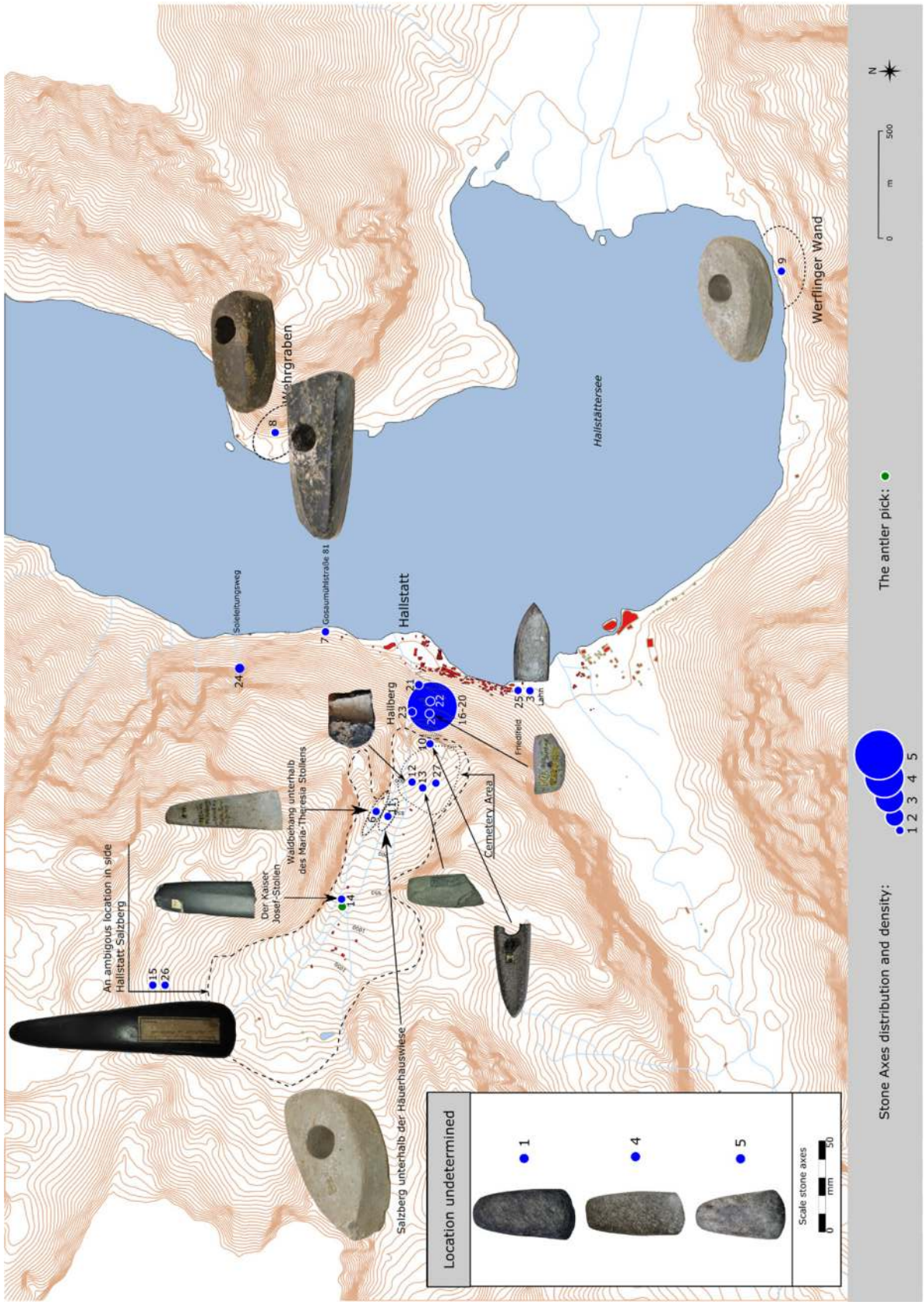

Figure 3. Distribution of stone axes around Hallstatt. Photos: Alfons Figuls i Alonso and Andreas W. Rausch.

Table 1: Metric and mechanical data of the analyzed parts.

			mm			g											At the top		At the bottom	
Museum	Ref.	Map	Maximum length	Maximum width	Maximum thickness	Weight	l	a	b	IPDP	h	h'	Asymmetry	Angle of sharpening	Angle of the distal part	Angle of work	Maximum eye	Minimum eye	Maximum eye	Minimum eye
MH	**18653**	**1**	**109,12**	**53,85**	**16,05**	**190**	**14,483**	**53,579**	**14,423**	**1,14E-04**	**10,046**	**13,879**	**0,724**	**52,934°**	**26,874°**					
MH	P12	2	36,72	66,75	21,08	66	15,070	63,747	12,204	1,09E-04	10,524	14,967	0,703	44,087°						
MH	15714	3	87,28	38,7	32,57	213	32,476	38,474	30,328	3,36E-05	9,850	16,374	0,602	50,059°						
MH	18650	4	114,6	51,81	32,3	350	14,153	49,179	16,422	1,11E-04	8,572	11,495	0,746	61,776°	22,577°					
MH	18652	5	98,22	54,26	26,45	215	13,336	54,069	17,742	9,95E-05	9,395	13,519	0,695	66,324°	29,460°					
MH	P10	6	128,62	27,01	44,75	248	5,906	43,867	8,222	5,98E-04	1,336	5,559	0,240	69,681°	17,951°					
MH	18507	7	184,43	82,4	64,42	1675	27,545	61,999	57,193	1,30E-05	21,882	27,26	0,803	24,771°		85,87°	33,132	30,640	33,508	33,120
MH	P6	8	134,75	60,24	54,93	751	20,721	48,514	55,924	2,26E-05	16,401	17,376	0,944	27,994°		86,48°	33,158	32,434	33,299	31,596
MH	P9	9	128,38	106,2	48,19	696	52,079	49,676	60,251	8,17E-06	5,592	16,078	0,348	65,644°		89,81°	30,525	28,582	30,642	28,958
MH	P7	10	103,9	46,99	46,8	485	28,859	40,423	27,413	3,98E-05	4,278	9,423	0,454	50,810°		87,56°	18,708	18,630	19,691	19,553
MH	P8	11	166,4	86,8	64,6	1566	82,211	62,914	81,498	3,02E-06	6,409	12,473	0,514	73,540°		88,35°	36,417	35,518	37,038	34,710
NHM	78095	12	64,84	51,64	29,08	159														
NHM	78094	13	84,12	34,66	29,4	133									13,892°					
NHM	77577	14	112,64	39,11	42,07	352									7,728°					
NHM	63348	15	248,4	60,53	38	861	1,181	27,182	4,916	8,07E-03	12,778	17,847	0,716	61,359 °	15,151°					

(MH): Museum Hallstatt. (NHM): Naturhistorisches Museum Wien

Group 1: Deforestation and woodworking tools?

Among the studied material, five pieces can be classified as having been used on relatively hard, but deformable surfaces such as wood (MH P10, MH 15714, MH 18650, MH 18652, MH 18653) (Figure 4). Detailed description of trace marks (binocular microscope 10x to 40x):

- MH P10: The distal zone (cutting edge) shows a thick cutting edge, clean and irregular chips can be observed, the cut tendency is harmonious.
- MH 15714: The distal zone (cutting edge) shows a slightly jagged (peaks and hollows) cut, no chips were observed, but perpendicular marks are visible and the cut tendency is quite harmonious.
- MH 18650: The distal zone (cutting edge) shows a slightly jagged (peaks and hollows) cut, no chips were observed, the cut tendency is quite harmonious.
- MH 18652: The distal zone (cutting edge) shows a slightly jagged (peaks and hollows) cut, chips are present, the cut tendency is quite harmonious.
- MH 18653: The distal zone (cutting edge) shows a harmonious cut tendency and a thick cut.

Group 3: Mining tools?

Three pieces were used on very hard surfaces, such as rock salt (MH P6, MH P7, MH 18507) (Figure 5, 6 and 7). Detailed description of trace marks (binocular microscope 10x to 40x):

- MH P6: The piece shows a big deterioration in the proximal zone (asymmetric), with chips of different sizes and quite irregular shape, affecting up to half the piece. In the attack border, it presents a uniform compacted surface as a consequence of the strength received from the impacts. MH P6 represents quite a singular piece. In its distal zone marks caused by the use as a pylon can be observed.
- MH P7: The object shows an asymmetric and rounded cut and an irregular big chip one of the sides. The distal zone was broken of off by the stress of hitting a very hard surface.
- MH 18507: The piece shows a big deterioration in the proximal zone (asymmetric), with chips of different sizes and quite irregular shape, affecting up to 2/3 of the object. In the attack border, it presents a uniform compacted surface as a consequence of the strength received from the impacts.

Other

Three pieces were used on hard surfaces (MH P8, MH P9, MH P12). Two distal zone fragments show signs of use on very hard surfaces or were incorrectly used (NHM 78094 and NHM 78095). Two axes (NHM 63348 and NHM 77577) could represent prestige axes (see below).

Prestige axes?

Between 4800 to 3500 BC, large, elaborately polished axes made of alpine rocks (e.g. eclogite, omphacite, jadeite or, more rarely, serpentine, amphibolite or nephrite) circulated throughout Occidental Europe, as socially highly valued objects (Pétrequin et al. 2012).

Two of the studied pieces (NHM 63348 and NHM 77577) show characteristics that lead us to consider the category of prestige axes, although typologically they do not conform to the forms described by P. Petrequin (Pétrequin et al. 2012). Both objects represent so called *Schuhleistenkeile*. In particular, the object NHM 63348 makes an impressive case (Figure 8). The large axe is highly polished and shows an elaborate distal zone with a strongly rounded shape. The cutting edge displays a chip that cannot be attributed to percussion activity. Additionally, marks that were caused by the influence of heat are visible. The object NHM 77577 represents a distal zone fragment. Its morphology is comparable to NHM 63348, but the surface shows a very irregular polish.

Comparing the stone tools of the Vall Saline to the Hallstatt pieces

More than 250 stone tools were documented in the salt outcrop of the Vall Seca-Riera Salada. 80% of the studied objects represent mining tools (Fíguls et al. 2010 and 2011). Typologically axes, adzes, chisels and mining picks were observed, but no hammers (neither grooved nor perforated). Through the percussion of these tools on the rock salt, blocks of salt were cut.

These tools show particular breaks and erosion patterns. Thick cuts that tend to a rounded deformation can be observed. Different types of breaks can be observed. Some are caused by the mineralogical composition; others are due to the structural formation or material fatigue, etc., but all of them are related to extraction and percussion work. We observe in the Vall Salina material the following traces or patterns:

- Chips of lenticular form: Can cover a considerable part of the polished cut edge. A comparable pattern can be observed in the Hallstatt pieces MH P7 and MH 18507.
- A big chip that can represent up to two thirds of the stone axe. These types of macro traces result from the percussion of the stone axe on a very hard material such as rock salt. It is a clean break, flat or slightly convex and parallel to the transversal edge. The Hallstatt stone axes MH P6

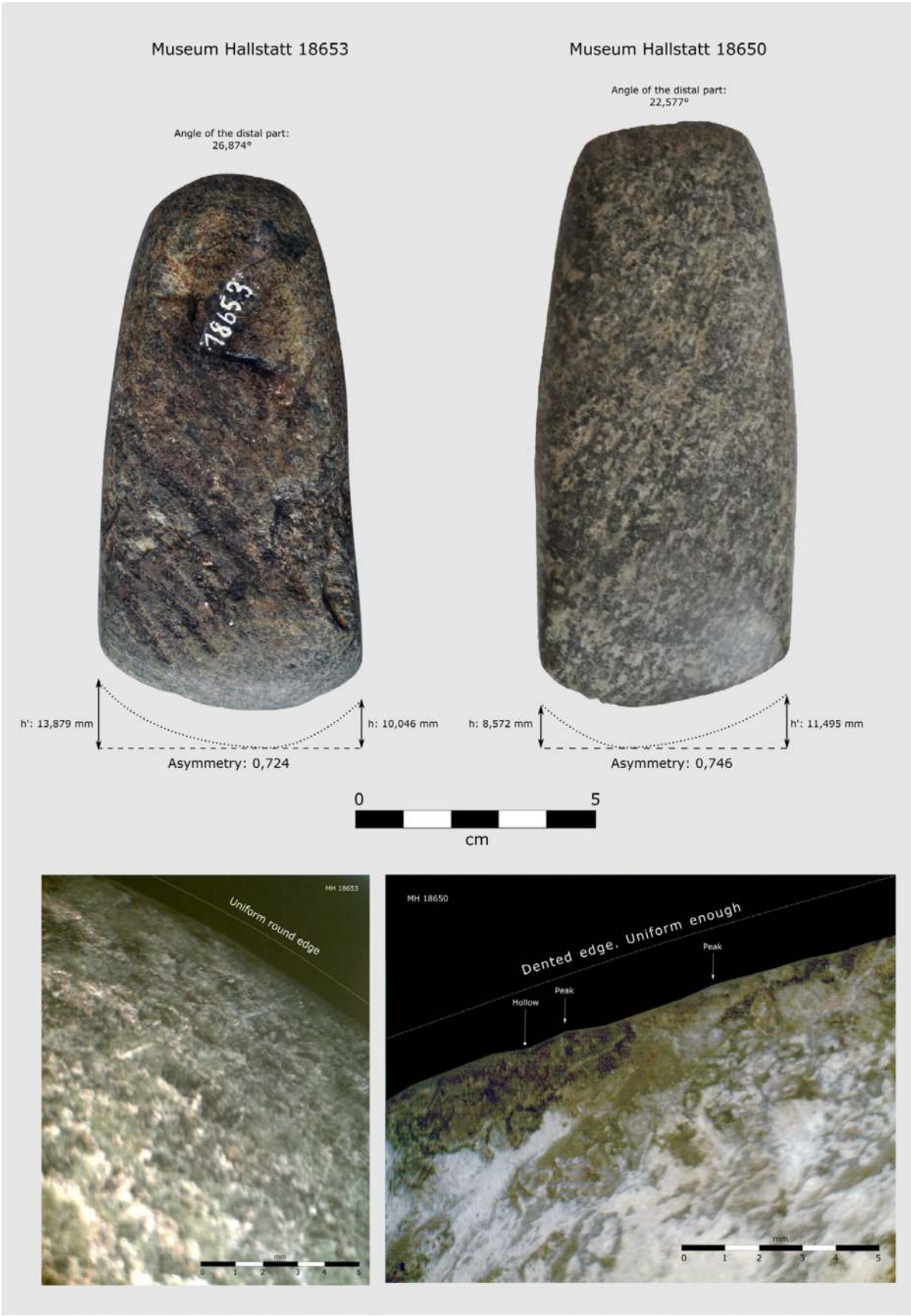

Figure 4: Group 1: Stone axes for deforestation and woodworking tools (MH 18653 and MH 18650). Trace marks microscopicals (MH 18653 and MH 18650). Photos: Alfons Fíguls.

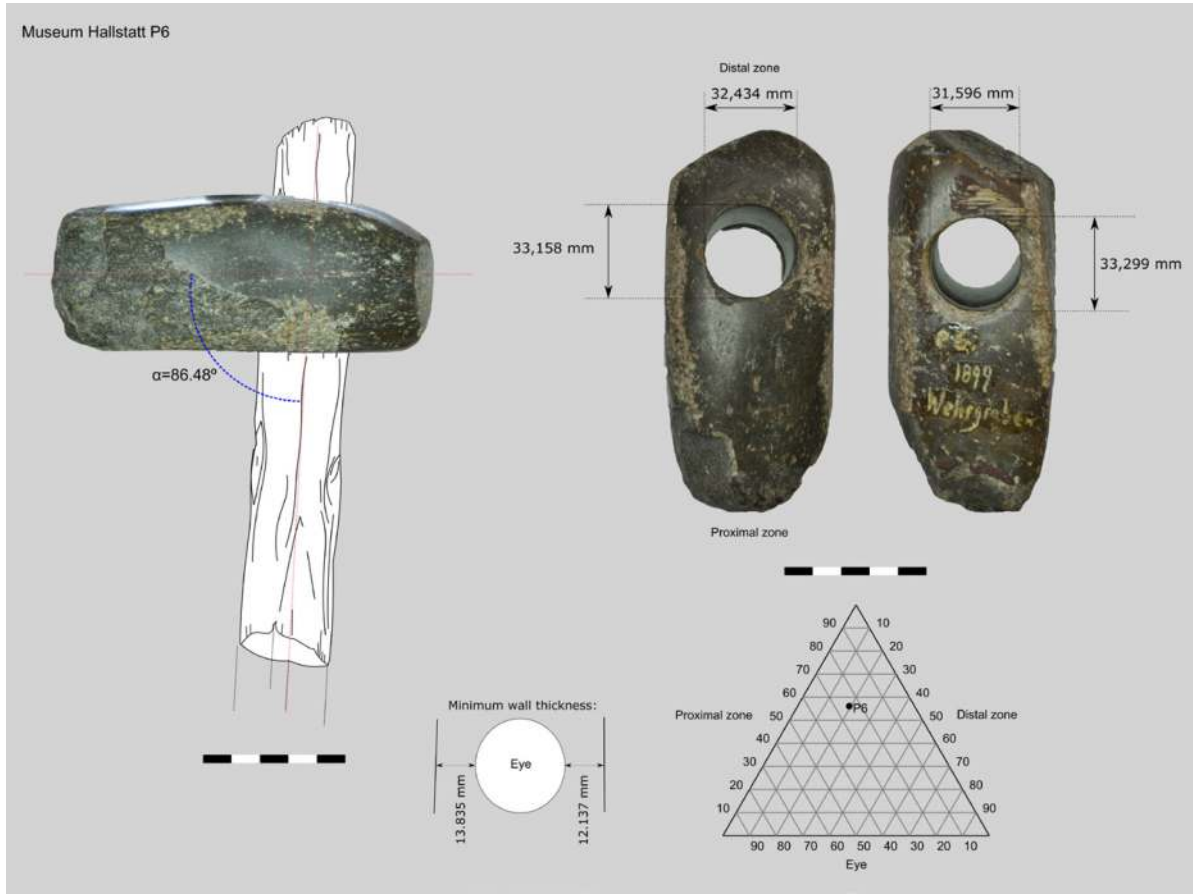

Figure 5: Group 3: Mining tools. Stone axe MH P6. Photos: Alfons Fíguls.

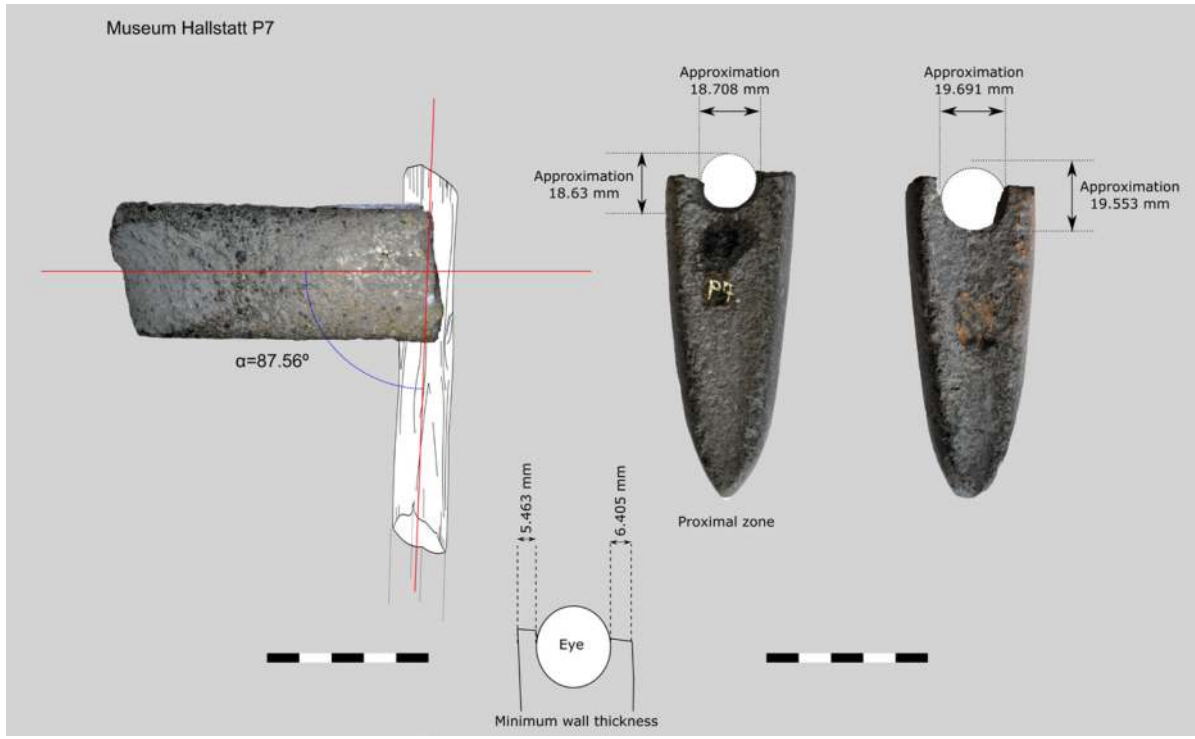

Figure 6: Group 3: Mining tools. Stone axe MH P7. Photos: Alfons Fíguls.

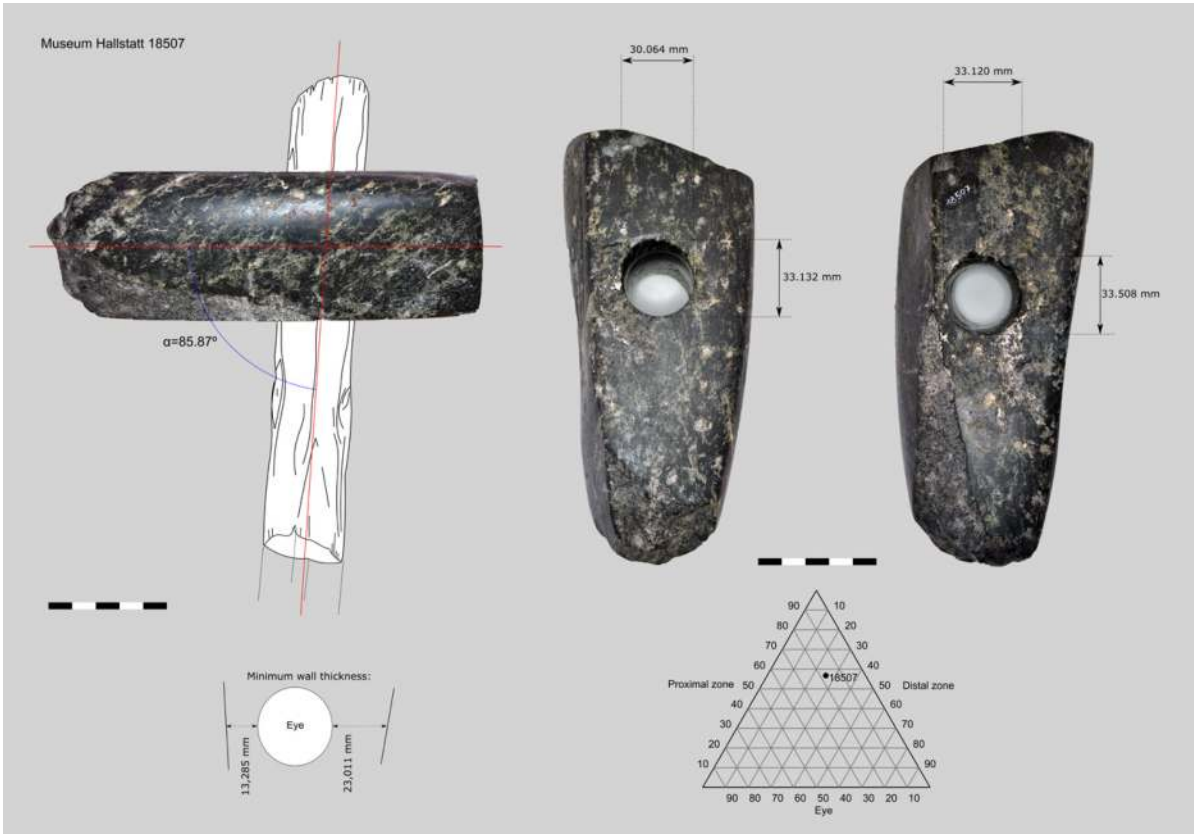

Figure 7: Group 3: Mining tools. Stone axe MH 18507. Photos: Alfons Fíguls.

and MH 18507 both show macro traces (chips) that affect between ½ and 2/3 of the pieces.

- Block breaks of different shape can overlay each and blend into one surface. This can be observed on the Hallstatt stone axes MH P6 and MH 18507.

In the Vall Salina, a series of experimental works were conducted. We started from the hypothesis that the mid-Neolithic salt exploitation did not use specialised mining tools. Our results showed that every lithic cutting tool could be used efficiently for mining rock salt in the Vall Salina. The resulting macro marks were identical to the ones documented in the prehistoric objects from the Vall Salina area.

Figure 8: Prestige axe NHM-63348. Photos: Alfons Fíguls.

Discussion

Direct and unambiguous evidence for underground salt mining in Hallstatt dates to the middle Bronze Age (Reschreiter and Kowarik 2009: 45). From this time onwards we observe highly complex production systems in Hallstatt (Kowarik et al. 2010). Neolithic activity in the Hallstatt area was evidenced by a certain amount of finds (stone axes, antler pick), but could not be specified any further. But traceological analysis conducted on a set of stone axes from the Hallstatt area has now resulted in substantial new insights. Several stone axes show clear evidence for percussion activity on hard and very hard surfaces. This suggests that these tools were employed to mine rock salt. These observations could further be substantiated through the comparison with stone tools from the Vall Salina in Cardona. This represents the first strong indication for Neolithic salt mining in the Hallstatt High Valley.

Furthermore, those stone axes displaying signs of percussion activity on hard and very hard surfaces are restricted to the group of perforated axes. And all perforated axes in the investigated sample show signs of percussion activity on hard or very hard surfaces. This represents a rather intriguing observation, as this use pattern stands in definite contrast to the findings from Cardona, where a broad spectrum of stone tools was used (axes, adzes, chisels and mining picks) (Weller and Fíguls 2013). As the investigated Hallstatt sample was rather small (15 axes) these results should be considered preliminary.

As to the spatial distribution of the stone axes, the highest concentration is located on the steep slope of the Salzberg, which connects the lake area with the High Valley. However, the two pieces that present the best evidence were neither found on the slopes of the Salzberg nor in the Hallstatt High Valley. Remarkably, two of the pieces showing the clearest evidence for percussion on very hard surfaces were not found in this area. One was discovered in the town of Hallstatt 400 m below the High Valley and the prehistoric mining areas and the other on the opposite side of lake (Wehrgraben). Investigating patterns of spatial distribution will be part of our future efforts.

As these preliminary results shed more light on the question of Neolithic salt exploitation in Hallstatt they also raise new questions. What was the function of the group 1 axes (percussion on relatively hard surfaces)? As stressed before, stone axes were of great importance for Neolithic communities in a variety of contexts. With respect to mining, they might have been used for felling and working on mine timber. How can we explain the presence of two prestige axes in the Hallstatt High Valley? Raw material determination for the prestige axes as well as for the other axes has not yet been concluded. For the prestige axes "omphacite" is being discussed. The next deposits are located in Bavaria (Germany) and in Carinthia (Austria) (Lafuente et al. 2015). Also, the raw material of the other axes (material of metamorphic origin) must have come from further outside the Hallstatt area. This leads us to question as to whether these axes were acquired in exchange for salt and what value might have been attributed to the Hallstatt salt. Do we have to assume exchange networks encompassing neighboring communities (Figure 1)? What type of exploitation are we facing in Hallstatt, communal as has been proposed for Cardona (Weller and Fíguls 2013), or a structure controlled by one community? At present there is not enough data to determine this question for Hallstatt.

References

Barth, F. E. 1986. *Der urzeitliche Bergbau im Grüner-Werk des Salzbergwerkes Hallstatt: Ausstellung des Naturhistorischen Museums Wien und des Musealvereines Hallstatt vom 8. Mai bis Herbst im Prähistorischen Museum Hallstatt.* Hallstatt: Musealverein Hallstatt.

Barth, F. E. 1987. *KG Hallstatt, MG Hallstatt, VB Gmunden*, Fundberichte aus Österreich, 26, Wien: 200.

Barth, F. E. 2009. The uniqueness of Hallstatt. In A. Kern, K. Kowarik, A. W. Rauch, H. Reschreiter (eds.), *Kingdom of Salt: 7000 years of Hallstatt*. Natural History Museum, Vienna: 14-15.

Bonache, J. 2007. Aplicación de algoritmos de Clustering a la clasificación del utillaje de piedra pulimentada lítica de Cardona (Cataluña, España). In A. Fíguls and O. Weller (eds.), *Prehistoric and Protohistoric Workshop, Cardona 6 de diciembre del 2003*: 135-140. Cardona: IREC.

Buchvaldek, M., Lippert, A., Košnar, L. (eds.) in cooperation of Popelka, M., Krenn-Leeb, A., Klír, T. 2007. *Archeologický atlas pravěké Evropy. Atlas zur prähistorischen Archäologie Europas. Archaeological Atlas of prehistoric Europe. Atlas archéologique de l'Europe préhistorique*. Univerzita Karlova v Praze, Nakladatelstvî Karolinum.

Donnart, K., Hamon, C., Daire, M. Y. 2012. L'outillage en pierre à l'âge du Fer exemples d'un potentiel à exploiter. In G. Marchand and G. Querré (dir.). *Roches et sociétés de la Préhistoire entre Massifs cristallins et Bassins sédimentaires: le Nord-Ouest de la France dans son contexte européen*: 223-238. Rennes: Presses Universitaires de Rennes.

Fíguls, A. and Bonache, J. 1997. Estudi del material lític del Museu de Sal Josep Arnau (Cardona, Bages), *XXXIX Assemblea intercomarcal d'estudiosos. Cardona 22 i 23 d'octubre de 1994*, Foment Cardoní-Patronat Municipal de Museus de Cardona: 143-162.

Fíguls, A. 2013. *Assaig metodològic per a l'anàlisi de les eines* lítiques mineres de *tall i de percussió de la Vall Salina*

de Cardona (Bages), Treball fi de Màster, Universitat Autònoma de Barcelona.

Fíguls, A., Weller, O., Grandia, F., González, J., Bonache, J. 2010. La indústria lítica polida del Solsonià: estudi de la matèria primera, distribució de les eines polides i intercanvi a la Depressió Central Catalana i Prepirineu central català durant el neolític mitjà a Catalunya". In *2n Colloqui d'Arqueologia d'Odèn. Home i Territori. Darreres investigacions al Prepirineu lleidatà 2006-2008:* 29-38. Museu Diocesà i Comarcal de Solsona, Solsona.

Fíguls, A., Weller, O. Grandia, F. 2011. La Vall Salina de Cardona: los orígenes de la minería de la sal gema y las transformaciones socioeconómicas en las comunidades del neolítico medio catalán. In F. J. Abarquero Moras, E. Guerra Doce (eds.), *Los yacimientos de Villafáfila (Zamora) en el marco de las explotaciones salineras de la prehistoria europea*: 49-83. Valladolid: Junta de Castilla y León.

Hamon, C. 2007. Modes de subsistance et activités dans le Chalcolithique du Caucase nord: étude fonctionnelle des outils en pierre de la culture de Maïkop. In: B. Lyonnet (ed.). *Les cultures du Caucase (VIe-IIIe siècle avant notre* ère*). Leurs relations avec le Proche-Orient*: 189-198. Paris: Editions recherches sur les civilisations, CNRS.

Kern, A. 2010. Das Hallstätter gräberfeld. In A. Kern, L. Lammerhuber (eds.). *Hallstatt 7000*: 23-35. Baden: Edition Lammerhuber.

Kowarik, K. Reschreiter, H. Wurzer, G. 2010. Modelling the Bronze Age Salt Mines of Hallstatt. In P. Anreiter et alii (eds.), *Mining in European History and its Impact on Environment and Human Societies. Proceedings for the 1st Mining in European History-Conference of the SFB-HIMAT, 12-15. November 2009*: 199-208. Innsbruck: Innsbruck University Press.

Kowarik, K., Reschreiter, H. 2009. The earliest traces. In A. Kern, K. Kowarik, A. W. Rauch, H. Reschreiter (eds.), *Kingdom of Salt: 7000 years of Hallstatt*: 44-45. Vienna: Natural History Museum.

Král, V. Limburský, P. Menšík, P. 2015. Polished Stone Tools of the Early Bronze Age in Bohemia, *Archäologisches Korrespondenzblatt* 45: 335-343.

Lafuente, B., Downs, R. T., Yang, H., Stone, N. 2015. The power of databases: the RRUFF project. In: T. Armbruster and R. M. Danisi (eds.), *Highlights in Mineralogical Crystallography*: 1-30. Berlin: De Gruyter.

Lammers-Keijsers, Y. M. J. 2008. *Tracing Traces from Present to Past. A functional analysis of pre-Columbian shell and stone artefacts from Anse à la Gourde and Morel, Guadeloupe, FWI*. Leiden: Leiden University Press.

Leutner, N., Reitinger, J. 1983. KG Hallstatt, MG Hallstatt, VB Gmunden (ÖK 96, W 93 mm, S 138 mm), Fundberichte aus Österreich, 22: 235, Wien.

Maluquer de Motes, J. 1980. Notes de prehistòria catalana: una indústria lítica de la comarca de la Noguera, Pyrenae. *Journal of Western Mediterranean Prehistory and Antiquity*, 1979-1980, 15-16: 251-266.

Morton, F. 1957. Weitere Neufunde aus Hallstatt, *Archaeologia Austriaca* 22: 32-34.

Morton, F. 1966. Neue Funde aus Hallstatt, *Jahrbuch des oberösterreichischen Musealvereins* 111: 161-165.

Morton, F. 1984. *Salzkammergut*. Hallstatt: Verlag des Musealvereines Hallstatt.

Morton, F. 1995. *Hallstatt und die Hallstattzeit*, Hallstatt: Verlag des Musealvereines Hallstatt.

Orozco-Köhler, T. 2000. *Aprovisionamiento e Intercambio: análisis petrológico del utillaje pulimentado en la Prehistoria Reciente del País Valenciano (España)*. British Archaeological Reports, 867, Oxford: Archaeopress.

Ortiz Mateo, M. 2004. La minería antigua de Riotinto (Huelva). *De Re Metallica 3 diciembre 2004, 2a época*: 23-32.

Pétrequin, A.-M. and Pétrequin, P. 1988. *Le Néolithique des Lacs, Préhistoire des lacs de Chalain et de Clairvaux (4000-2000 av. J.-C.)*. Paris: Collection des Hespérides, Editions Errance.

Pétrequin, A.-M. and Pétrequin, P. 2002. *Écologie d'un outil : la hache de pierre en Irian Jaya (Indonésie)*. Paris, CNRS Editions, Monographie du CRA 12.

Pétrequin, A.-M. and Pétrequin, P., in collab. with Weller, O. 2006. *Objets de pouvoir en Nouvelle-Guinée*. Catalogue de la donation Pétrequin au Musée des Antiquités Nationales, Saint-Germain-en-Laye. Paris: Réunion des Musées Nationaux.

Pétrequin, P. Cassen, S., Gauthier, E., Klassen, L., Pailler, Y., Sheridan, A. with collaboration of Desmeulles, J., Gillioz, P. A., Le Maux, N., Milleville, A., Pétrequin, A.M., Prodéo, F., Samzun, A., Fábregas, Valcarce, R. 2012. Typologie, chronologie et répartition des grandes haches alpines en Europe occidentale. In P. Pétrequin, S. Cassen, M. Errera, L. Klassen, A. Sheridan, A.-M. Pétrequin (dir.), *JADE: Grandes haches alpines du Néolithique européen. Ve et IVe millénaires av. J.-C.* (t. 1), chapitre 11: 574-727. Besançon: Presses universitaires de Franche Comté et CRAVA : Cahier de la MSHE Ledoux, n°17, série «Dynamiques territoriales».

Pétrequin, P. and Jeunesse, C. 1995. *La hache de pierre. Carrières vosgiennes et échanges des lames polies pendant le Néolithique 5400- 2100 av. J.-C*, Paris: Editions Errance.

Piel-Desruisseaux, J. L. 1989. *Instrumental prehistórico, forma, fabricación, utilización*. Barcelona: Masson S.A.

Piel-Desruisseaux, J. L. 2011. *Encyclopédie pratique des outils prehistòriques. 150 outils et gestes techniques*. París: Dunod.

Ramseyer, D. 1987. Emmanchements de l'outillage lithique néolithique de quelques stations littorales du canton de Fribourg (Suisse occidentale). In D. Stordeur (ed.), *La Main et l'Outil. Manches et emmanchements préhistoriques. Table Ronde C.N.R.S. tenue à Lyon du 26 au 29 novembre 1984*. Lyon: Maison de l'Orient et de la Méditerranée Jean Pouilloux: 211-218. (Travaux de la Maison de l'Orient, 15); http://www.persee.fr/doc/mom_0766-0510_1987_act_15_1_1711

Reschreiter, H., Kowarik, K. 2009. The question of origens. In A. Kern, K. Kowarik, A. W. Rauch, H. Reschreiter (eds.), *Kingdom of Salt: 7000 years of Hallstatt*: 46-47. Vienna: Natural History Museum.

Reschreiter, H., Kowarik, K. 2010. 7000 Jahre Salz. In A. Kern, L. Lammerhuber (eds.), *Hallstatt 7000*: 37-49. Baden: Edition Lammerhuber.

Risch, R. and Martínez Fernández, F. 2008. Dimensiones naturales y sociales de la producción de hachas de piedra en el noreste de la Península Ibérica. *Trabajos de Prehistoria* 65, 1, Enero-Junio: 47-71.

Semenov, S. A. 1981. *Tecnología prehistórica (Estudio de las herramientas y objetos antiguos a través de las huellas de uso)*. Madrid: Editorial Akal.

Stöllner, T., Thomas, P. 2015. Eine Zeitreise durch 10.000 Jahre Bergbau in den Ostalpen: Begleitbuch zur Ausstellung „Bergauf Bergab - 10.000 Jahre Bergbau in den Ostalpen" Veröffentlichung aus dem Deutschen Bergbau-Museum Bochum, Bochum.

Stöllner, T. 1996. Neue Beiträge zur vorgeschichtlichen Besiedlung von Hallstatt. *Jahrbuch des Oberösterreichischen Musealvereines* 141: 117-158.

Unterberger, H. 1981. Hallstatt. *Fundberichte aus Österreich*, 20: 338-339.

V.A. (1965). Ein neolithischer Fund aus Hallstatt, Oberösterreich. Archaeologia Austriaca, 38: 99-100.

Weller, O., Fíguls, A. 2013. Die erste Steinsalzgewinnung Europas und der Tauschhandel als wirtschaftlicher Dynamisierer der mittleren Jungsteinzeit in Katalonien. Das Vall Salina von Cardona (Katalonien, Spanien). *Archäologisches Korrespondenzblatt, Jahrgang* 43, 2013, Heft 2: 159-173.

Considerations on Salt Exploitation in Bukovina, from Prehistory to Modern Times

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Abstract

This article presents the history of salt exploitation in Bukovina, from paleolithic to the end of XVIII century, when this region - situated in the north-east part of Romania - was under the Austrian Empire. The authors have conducted diverse research, including archaeological excavations, at almost all the salt springs. It is possible that the salt spring from Doroteia has archaeological remains even from the paleolithic age.

Salt sources have been used by all communities from this area, but without archaeological remains. Even the archaeological Cucuteni culture used 'industrial exploitation' of salted water through boiling of the brine. In the middle ages, orthodox monasteries used these salt sources, making commerce with the villages close to their sites. Later, under Austrian administration, the use of these sources of salt water was regulated so the exploitation of solid salt started in the year 1790 in Cacica, Bukovina.

Keywords: Archaeology of salt, Bukovina, Austrian Empire.

It is well known that the north-western territory of historic Moldavia, which after the occupation of the Habsburg Empire in 1775 became known as *Buchenland*, (Land of Beech Trees), is a salt-rich region. If we took a look at the map of Romania (Figure 1), we would observe a high density of underground salt deposits,

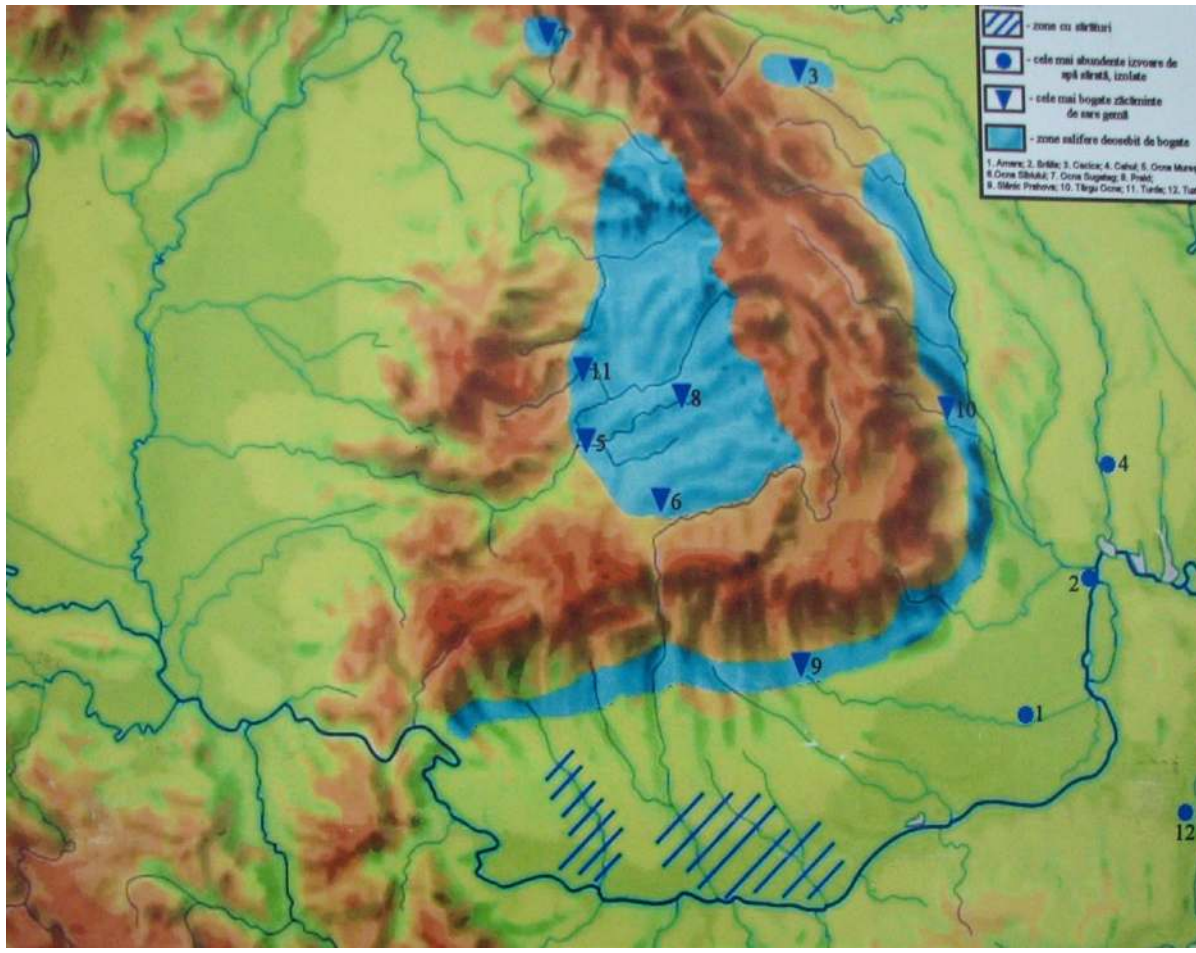

Figure 1. Areas with deposits of salt (blue) in Romania.

reminiscent of the former Sarmatic Sea, which used to occupy approximately twice the territory of today's Black Sea (Figure 1).

Similarly, within the study area, the salt was used over millennia in the form of salt water, while these larger or smaller salt springs (some of them disappearing over time) have even given their name to a number of villages, such as Soloneţ from the Slavic' СОЛ' (salt) and other hydronyms.

It is certain that brine springs were actually used uninterruptedly by all populations who have lived in the territory over the course of time. However, not all have left archaeological vestiges around salt springs. The properties of these springs were discovered by the first humans of the Palaeolithic, who were always on the move looking for food and who used them as settlements from one generation to another.

Over millennia, the salt springs used were mainly the most accessible ones, the closest to the plateaus or in the foothill areas. Most of them can be found grouped in Solca and Solonețul Nou - Cacica sectors (14 out of 29). Based on the results of the field research we have been conducting over a period of more than 35 years, the mountain area in the Western Carpathians was only inhabited starting from the Middle Ages, most likely since the 14th century. We believe that this phenomenon was also extended to the north, to the mountain region of northern historic Bukovina, currently the Chernivtsi province (Ukraine), which together with Eastern Moldavia (Bessarabia) was ceded by Romania to Stalin's Empire with the Ribbentrop-Molotov Pact. The salt deposits stretch from Bukovina to southern Moldavia over a band of 0.5 to 2.3 km wide (Figure 2).

In spite of its advancement towards the mountain area (Figure 3), at the salt fountain from Doroteia village (850 m altitude) the authors found lithics made of local stones by prehistoric peoples, but not of flint, nor any pottery, which might suggest they belonged to the Palaeolithic. As a matter of fact, a few kilometres north from this place he also found a Palaeolithic site, lacking any other archaeological evidence on a 20 km radius (Andronic 2008: 12). Considering all this, we ask ourselves whether this archaeological site could be the oldest evidence of people using salt in Europe or even in the world.

There is no doubt that if digs were to be conducted here one day, these vestiges would be more accurately dated, which regardless deserve experts' attention in the future.

Along with the Early Neolithic and the stabilisation of human communities, in spite of the extremely low population density, people could use these water sources on a regular basis on site and could also transport certain amounts of brine to their settlements using skin bottles as the most convenient method. In the course of time they obviously learned how to use brine to preserve food, especially for winter.

The first Neolithic archaeological culture in Bukovina was Starčevo-Criş. East of the Western Carpathians, this culture could be dated using the radiocarbon method and thus localised in the interval around 6105 BP – 6665 BP (Mantu 2000: 98). During the dig at the Voitinel salt spring (Voitinel commune) the authors also found some scattered pottery fragments of this culture (Andronic and Ursu 2003: 314). They were occasional occurrences during the warm season or maybe the cold one, when some pots for everyday use could also be broken.

Other pot fragments were found at Solca, Slatina Mare site (Andronic 1989: 17; Ursulescu 1977: 303-315).

The pottery remains from the Middle Ages near fountain-like salt springs are not quite as numerous also due to the fact that, unfortunately, the archaeological digs conducted so far, mainly by M. Andronic, were not on a large scale. Another logical explanation is the assumption that, over the ages, people frequently moved

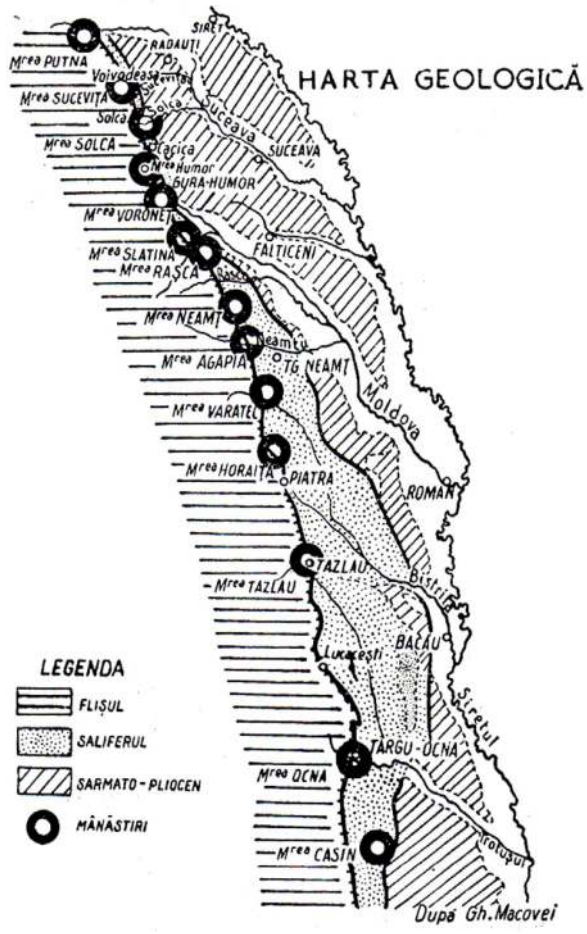

Figure 2. The geological map of the pre-mountain slopes of Moldova (dotted the deposit of salt, circle - monasteries) – by Şandru, 1952.

from one spring to another and did not use or break pots in the same place. This is why many other civilisations did not leave such vestiges near salt water sources. The phenomenon is even larger, including at the European level.

Therefore, we pass over the linear pottery culture (around 5500-5000 B.C.), over the Precucuteni culture that lasted around five centuries, and we stop at the well-known Cucuteni culture, with its wonderful painted pottery, completely remarkable at a European and international level.

It is true that this culture existed over a larger period of time than the cultures before it, for around a millennium, and thus its communities had a lot of time at their disposal, beyond population growth and rising needs, to find solutions to increasingly higher salt consumption, including for domestic animals. And so we can already discuss with confidence, at least in phase B of this culture, of true 'exploitation' of salt, aiming at obtaining recrystallized salt from boiling brine, lacking any other possibility of proper mining.

Radiocarbon dating was used in Bukovina, at Mihoveni, not far from Suceava. Both samples analysed were dated: I-*Cucuteni B 1b,* CAL BC 1 sigma 3.999-3.970, CAL BC 2 sigma 4.038-3.822; II-*Cucuteni B 2a,* CAL BC 1 sigma 3.772-3.646, CAL BC 2 sigma 3.779-3.635 (Mantu 1998: 250-251; and Monah 1991: 387-399).

As a consequence, compact layers of pottery fragments resulted from disposable pots, the *briquette* - type used for boiling brine that existed in the forest near Solca city, from the river with the same name, and at Cacica, from the superior hydrographic basin of Soloneț.

At Cacica, where solid salt can be found at 17- 48 m deep, right in the courtyard of the salt mine (Figure 4), there is a layer of potsherds more than half a meter thick, while in a land slide larger briquette fragments are visible (Figure 5). M. Andronic used such pieces to rebuild a similar pot that could have contained around 1.5 L, meaning that these were larger than those known in Poland, for example (Andronic 1989: 171-177). After one more possible liquid filling in the process, men would get a type of dry cone-shaped salt of 1.5 kg, which was easy to transport and trade (Figure 6). Cucuteni communities did not expand this system to all salt springs. At the Voitinel salt spring or the one near Putna Monastery, no briquette fragments were found, until now, and neither at Cacica salt springs called Dulcea and Blândeţu (up to 300‰ salt concentration, just like in Solca), which were used by the villagers until the last world war.[1] As a result, in Cacica, only one Cucuteni community around 30 km east of this place used to boil brine and only in the warm season, while the communities further away did not.

The importance of this mineral has led not only to the existence of Cucuteni communities near the Solca, Cacica or Putna salt springs (like nearby Crasna, Chernivtsi – see Andronic and Niculică 2015 195-197), but also to the existence of archaeological sites from the Bronze Age (Noua culture) and from La Tène.

At Marginea, near the salt spring, the author found evidence of a pit with scale and pottery from the Hallstatt (Andronic and Ursu 2003: 341). Some later findings from Solca and Cacica are also significant for the 7th -11th centuries AD (Teodor 1997: 39, 128), a period still poorly understood among the sites in Bukovina (Suceava County). M. Andronic incidentally discovered the remains of a 10th – 11th century settlement right in the courtyard of his holiday home in Cacica (!), located approximately 400 m from the Dulcea salt spring. The village also comprises another perfectly contemporary or even earlier site. Along with building medieval villages and setting their boundaries, the salt springs were conferred the same particular importance. However, due to the fact that salt water sources were located on the border of the Suceava Plateau with the mountain area or even in the mountains, where the villages were later established, most of them happened to be part of the monasteries built with the good will of the medieval rulers of Moldavia. Under the circumstances, they also became a source of fixed income, as all the villages in the area used them to procure brine. Moreover, the rulers used to give many villages as a gift to the monasteries.

For example, in Cacica, on a plateau located a few hundred meters away from the Dulcea salt spring and further away from the second one, Blândeț, the Pârteşti Monastery was built after 1400 as a 'metoh' (parish dependency) of the well-known Humor Monastery (Figure 7). In the mountain area of its domain it also possessed a 'mountain called Ostra and the Ostra salt spring'- 1475. A 1583 document indicated that Sucevița Monastery had some 'salt springs located in those mountains', and it was reminiscent of a 'salt water road' (Andronic 1997: 124-125). The examples could continue.

Putna Monastery owned the salty spring nearby. Solca monastery had several springs located only a few kilometres away (Figure 8); Slatina Monastery had one about one kilometer away; and Rasca Monastery, a few others. These are just a few examples of many. As a rule, in the sales documents of the villages, these sources were also mentioned.

From the Middle Ages until the time that Bukovina was occupied by the Austrians, no attempts of

[1] In 1951, the Solca salt spring was 14.3 mc, Blândeţu was 21 mc, while Voitinel was 16 mc.

Figure 3. The salt fountain from Doroteia.

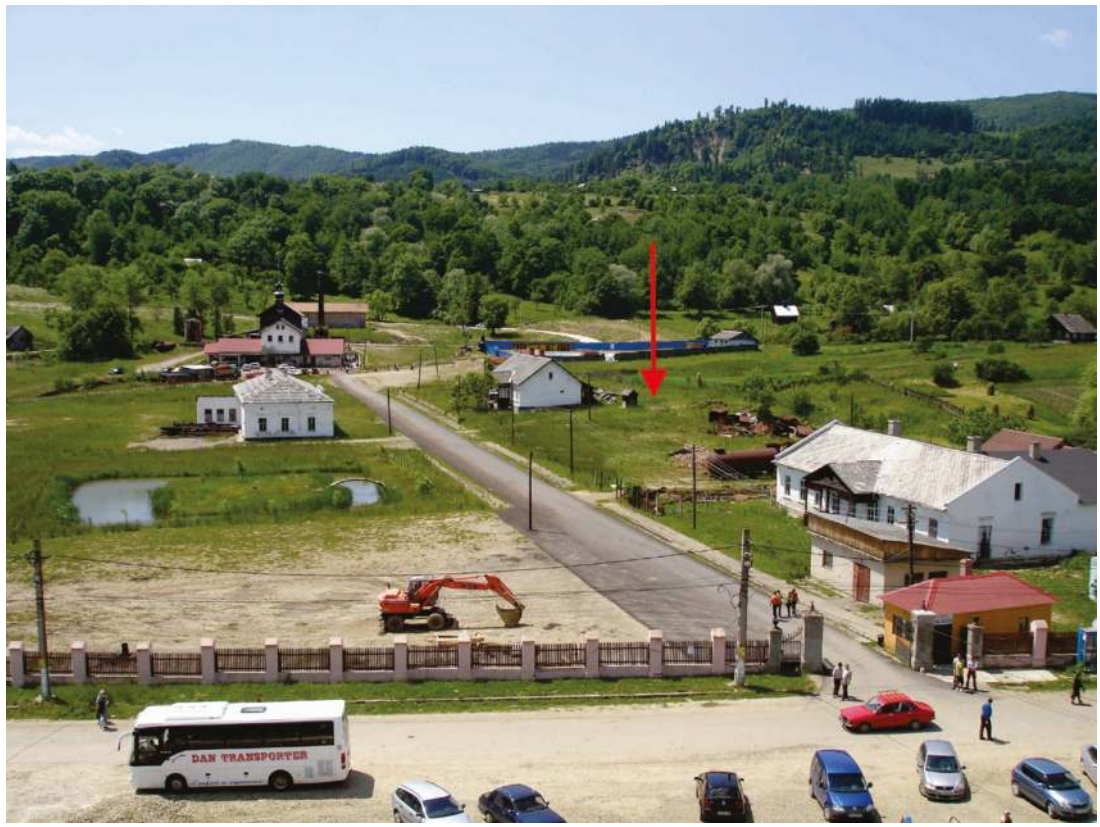

Figure 4. The location of the discoveries in the courtyard of the Cacica Mine.

Figure 5. Archaeological layer with the remaining vessels (briquette) from the mine Cacica.

Figure 6. The production phases of salt crystallization in Cacica, the Cucuteni culture (M. Andronic reconstruction).

Figure 7. The location of the former Pârteşti monastery (today Cacica), and salted water source Dulcea. (M. Andronic reconstruction)

industrialization of the saltwater springs or prospection of solid salt were made in Moldova. Neither the arousing of the greed of the Turks nor a decrease in the price of salt was wanted by the monopoly of the rulers, who gained substantial income to the treasury of the country.

The new Austrian leadership of Bucovina on April 26, 1785, abolished all of the monasteries and their property, except for three of the most important. In this situation, the saltwater springs incumbent upon their respective villages or land owners, except for their use by the public, was subjected to the regulations of the new administration.The recrystallized salt was brought to Bucovina by Hebrew merchants, with high prices, from Galicia, another Habsburg province, and the native rock salt from Moldova continued to supply the Turks. Shortly after the occupation, in 1775, the military governor of the new province, General Spleney, informed Vienna about the saltwater springs in Wizhnitz (today reg. Chernivtsi), in Putna and the valley of Soloneț. In the coming years, others were also mentioned in documents. In Pârteşti (today Cacica) it was noted that the peasants were throwing saltwater on large pyres, the salt depositing on the burning wood, and that in Krasna (still today Ukraine) sixteen peasants were encountered, known carriers, which were carrying spring saltwater in barrels in order to sell it in the surrounding villages.

In 1783, an imperial commission began exploring all salt springs. After one year, a firm for the prospection of salt was created in Solca, and in one of the saltwater springs here, the digging of a well was started. Specialists from Transylvania were brought and theri headquarters was established in the monastery here. Special boilers for the boiling of the spring saltwater were also made, two of them being in the woods, in Slatina Mare, where 12 tons of salt were produced each week. Such a boiler was also made in Pârteşti (Cacica) (Figure 9). For their operation, skilled workers were brought from Galicia.

In 1790 a mine was built in Solca, location of the only monastery storing salt.

The turning point in salt mining was 1790, when a drought led to the deepening of the saltwater fountain inside the mine that still exists in Cacica. As a result, at a depth of 12 meters, the deposit of salt stretching over a length of about one kilometer was discovered. A year later, the exploitation of solid salt began. For this purpose, the Polish settlers from Bohn and Wielicika received a number of facilities: land for gardening, wood for construction, and exemptions from taxes. In addition to solid salt, even more cauldrons for boiling the brine were built in Cacica. In the early nineteenth century, eight of them were already operating. The recrystallized salt that was still wet was pressed in conical shapes of cast iron, this product being called 'salt block'('huscă'), and it was marketed well (Figure 10). A boiler working 24 hours could produce 600 such forms of salt.

Figure 8. Solca monastery and one of the salty springs nearby.

Figure 9. The location of the boiler in Cacica for boiling the brine, according to an old Austrian map.

Figure 10. One of the boilers for boiling brine, Cacica, Austrian era.

After the start of the industrialization of salt, in order to strengthen the monopoly of salt, the former exploration wells were destroyed, and the most important saltwater springs Slatina Mare, Voitinel şi Cacica-Blândeţ came under state control. The remaining springs were walled. Due to a great discontent of the population in 1803, the free use of brine by the villages that had such springs was accepted, which, however, led to lower sales in the salt from the Cacica mine.

Because of the cost of wars against Napoleon, the empire did not have the financial power to invest further in the saline. Moreover, the price of salt increased. In 1806, a quintal of rock salt from Cacica was sold for 4 guilders and 50 kr. Therefore, the consumption decreased and the smuggling of salt brought from Moldova increased. After the wars against France, in 1820 financial resources for investments in Cacica were found, resulting in more efficient boilers and a new warehouse for salt.

In 1835, a law defined more clearly the state monopoly on all resources of salt, partly as a response to the unstoppable smuggling of salt.

In the event of the outbreak of the revolutionary movement of 1848 in Bucovina, in paragraph no. 9 of the requests made to the empire was a reduction in the price of salt, required especially by the poor, and the deputy Bodnar asked the Viennese parliament that the salty springs to be used freely (Ceauşu 1982: 377-392).

The administrative separation of Bukovina from Galicia, and the introduction of technical innovations, led to a lower price.

References

Alexianu, M., Weller, O. and Brigand, R. 2007. *Izvoarele de apă sărată din Moldova Subcarpatică. Cercetări etnoarheologice*. Iaşi, Casa Editorială Demiurg.

Andronic, M. 1989. Cacica – un nou punct neolitic de exploatare a sării. *Studii şi cercetări de istorie veche şi arheologie* 40, 2: 171-177.

Andronic, M. 1997. *Evoluţia habitatului uman în bazinul hidrografic Soloneţ din paleolitic până la sfârşitul secolului al XVIII-lea*. Iaşi, Editura Academiei Române.

Andronic M., 2007. Cercetări arheologice de teren în Bucovina (I). *Suceava* XXXI-XXXII-XXIII: 75-76.

Andronic M., 2009. L'exploitation du sel à l'Est des Carpates Orientaux dans la préhistoire et dans la protohistoire. *Studii şi cercetări de istorie veche şi arheologie* 59-60: 17-32.

Andronic, M. and Ursu, E. 2003. Voitinel, com. Gălăneşti, Marginea, com. Marginea, jud. Suceava. *Cronica Cercetărilor Arheologice* 2002: 314.

Andronic, M., Niculică, B.-P. 2015. New Archaological Research Relating to the Exploitation of Salt in Bucovina. In M. Alexianu, R-G. Curcă, V. Cotiugă (eds.) *Salt Effect. Second Arheinvest Symposium: From the etnoarchaeology to the anthropology of salt*: 191-198. Oxford, British Archaeological Reports International Series 2760.

Ceauşu, M. 1982. Contribuţii la istoricul exploatării sării la sfârşitul secolului al XVIII-lea şi în prima jumătate a secolului al XIX-lea în Bucovina. *Suceava*, IX: 377-392.

Mantu, C. M. 1998. *Cultura Cucuteni. Evoluţie, cronologie, legături.* Piatra Neamţ, Bibliotheca Memoriae Antiquitatis.

Mantu, C. M. 2000. Relative and Absolute Chronology of the Romanian Neolithic. *Analele Banatului, Arheologie, istorie* VII-VIII: 75-106.

Monah, D. 1991. L'exploitation du sel dans les Carpates Orientales et ses rapports avec la culture de Cucuteni-Tripolyie. In V. Chirica and D. Monah (eds.), *Le paléolithique et le néolithique de la Roumanie en contexte européen*: 387-400. Iași, Bibliotheca Archaeologica Iassiensis, IV.

Şandru, I. 1952. Contribuţii geografice-economice asupra exploatării slatinelor în Bucovina de Sud. *Studii şi Cercetări Ştiinţifice* III, 1-4: 407-423.

Teodor, D. Gh. 1997. *Descoperiri arheologice şi numismatice la est de Carpaţi în secolele V-XI,* Bucureşti, Muzeul Național de Istorie a României.

Ursulescu, N. 1977. Exploatarea sării din saramură în neoliticul timpuriu, în lumina descoperirilor de la Solca (jud. Suceava). *Studii şi cercetări de istorie veche şi arheologie* 28, 3: 307-315.

Unique Cucuteni Artefacts Used in the Salt Recrystallization Process

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Abstract

The study presents some ladle-shaped artefacts that are so far unique in cucutenian inventory, found in Cucuteni A_2 (4450-4150 BC) layers from the Chalcolithic *tell* site of Poduri-*Dealul Ghindaru* (Romania), located near several rich salt springs from the Moldavian Subcarpathians. The differences between these items and typical cucutenian ladles, their rarity and their discovery in a site where salt played a major role, compels us to associate them with the salt recrystallization process (salt production). Analogies can be made with a series of discoveries from Provadia-Solnitsata (Bulgaria), a major center of salt exploitation and capitalizing during the Neo-Eneolithic (5500-4200 BC).

Keywords: Chalcolithic, Cucuteni, Poduri, salt recrystallization, salt production, ladles, *briquetages*.

Introduction

In recent years, the interdisciplinary archaeological research regarding the preindustrial exploitation and valorisation of the rich resources of salt on the present territory of Romania experienced an extraordinary momentum, due to the importance this mineral always had for human communities as nourishment, a therapeutic and spiritual resource.

Consequently, the results of this work have been introduced into the scientific circuit through multiple research programs,[1] scientific meetings,[2] exhibitions[3] and publications (Weller (ed.) 2002; Cavruc and Chiricescu (eds.) 2006; Alexianu *et al.* 2007; Fíguls i Alonso and Weller (eds.) 2007; Monah *et al.* (eds.) 2007; Morère Molinero (ed.) 2007; Monah *et al.* (eds.) 2008; Weller *et al.* (eds.) 2008; Alexianu *et al.* (eds.) 2011; Nikolov and Bacvarov (eds.) 2012; Harding and Kavruk (eds.) 2013; Alexianu *et al.* (eds.) 2015; Brigand and Weller (eds.) 2015; Caliniuc *et al.* (eds.) 2015; Alexianu *et al.* (eds.) 2016), which reflect the contributions of numerous specialists in the field from prestigious institutions worldwide.

Often, scientists have referenced to various artefacts used by human communities from different periods and civilizations in the process of exploitation and commodification of salt, including recrystallization.

Regarding the Cucuteni culture, so far attention has been focused on the famous *briquetage* and Cucuteni C pottery, which have benefited from numerous analyses regarding the origin, the archaeological and cultural-chronological context, the formal and decorative typology, and the functionality. More recent are the endeavours of a technological nature and those in experimental archaeology. In some respects, there was

[1] 'Aux origines de la production du sel en Europe: préhistoire et écologie des Carpates Orientales Roumaines' – Programul de Acțiuni Integrate Brâncuși, 2003-2004, coordinators: D. Monah, O. Weller; 'Pre- and proto-historic salt springs exploitation in Moldavia (Romania), 2004-2015, coordinator: O. Weller; 'Exploatarea sării în preistoria României', 2007-2008, coordinator: D. Monah; 'The salt water springs of Moldavia. The ethnoarchaeology of a polyvalent natural resource, 2007-2010, coordinator: M.-T. Alexianu; 'The ethno-archaeology of salt springs and salt mountains from the extra-Carpathian areas of Romania', 2011-2016, coordinator: M.-T. Alexianu.

[2] International Colloquium 'Archéologie du sel en Europe. Le temps des synthèses' – XIVth UISPP Congress, Liège, Belgium, 2001; International Archaeological Meeting 'L'explotació de la sal', Cardona, Spain, 2003, organizers: A. Fíguls, J. Bonache, A. Martín, O. Weller, T. Schuhmacher, X. Clop, J.M. Mata; International Colloquium 'Arheologia pre- și protoistorică a sării', Piatra-Neamț, Romania, 2004, organizers: Gh. Dumitroaia, D. Monah, O. Weller, J. Chapman; International Congress 'Las salinas y la sal de interior en la historia: economia, medioambiente y sociedad', Sigüenza, Spain, 2006; International Colloquium 'Sel, eau et forêt, hier et aujourd'hui', Arc-et-Senans, France, 2006, organizers: A. Dufraisse, P. Pétrequin, O. Weller, H. Richard, I. Mouret; International Colloquium 'Sel, pratiques et connaissances', Iași, Romania, 2008, organizers: M.-T. Alexianu, O. Weller, R.-G. Curcă, V. Cotiugă, I. Moga; International Symposium Humboldt-Kolleg, Provadia, Bulgaria, 2010, organizers: V. Nikolov, K. Bacvarov; Second Arheoinvest Symposium 'De la etnoarheologia la antropologia sării', Iași, Romania, 2012, organizers: M.-T. Alexianu, R.-G. Curcă, V. Cotiugă; First International Congress on the Anthropology of Salt, Iași, Romania, 2015, organizers: M.-T. Alexianu, R.-G. Curcă; International Conference 'History and tradition of exploiting salt resources', Tokyo, Japan, 2016; International Session 'Archaeology of salt between local and global' – 8th World Archaeology Congress, Kyoto, Japan, 2016, organizers: M.-T. Alexianu, T. Kawashima, O. Weller, R. Brigand, F.-A. Tencariu; International Session 'Archaeological heritage of salt: preserving and interpreting' – International Committee on Archaeological Heritage Management Conference, Salalah, Oman, 2016, organizers: M. Alexianu, O. Weller, R. Brigand, R.-G. Curcă.

[3] 'Sarea, Timpul și Omul', National Museum of 'Eastern Carpathians', Sfântu Gheorghe, Romania, 2006-2008, organizers: V. Cavruc, A. Chiricescu.

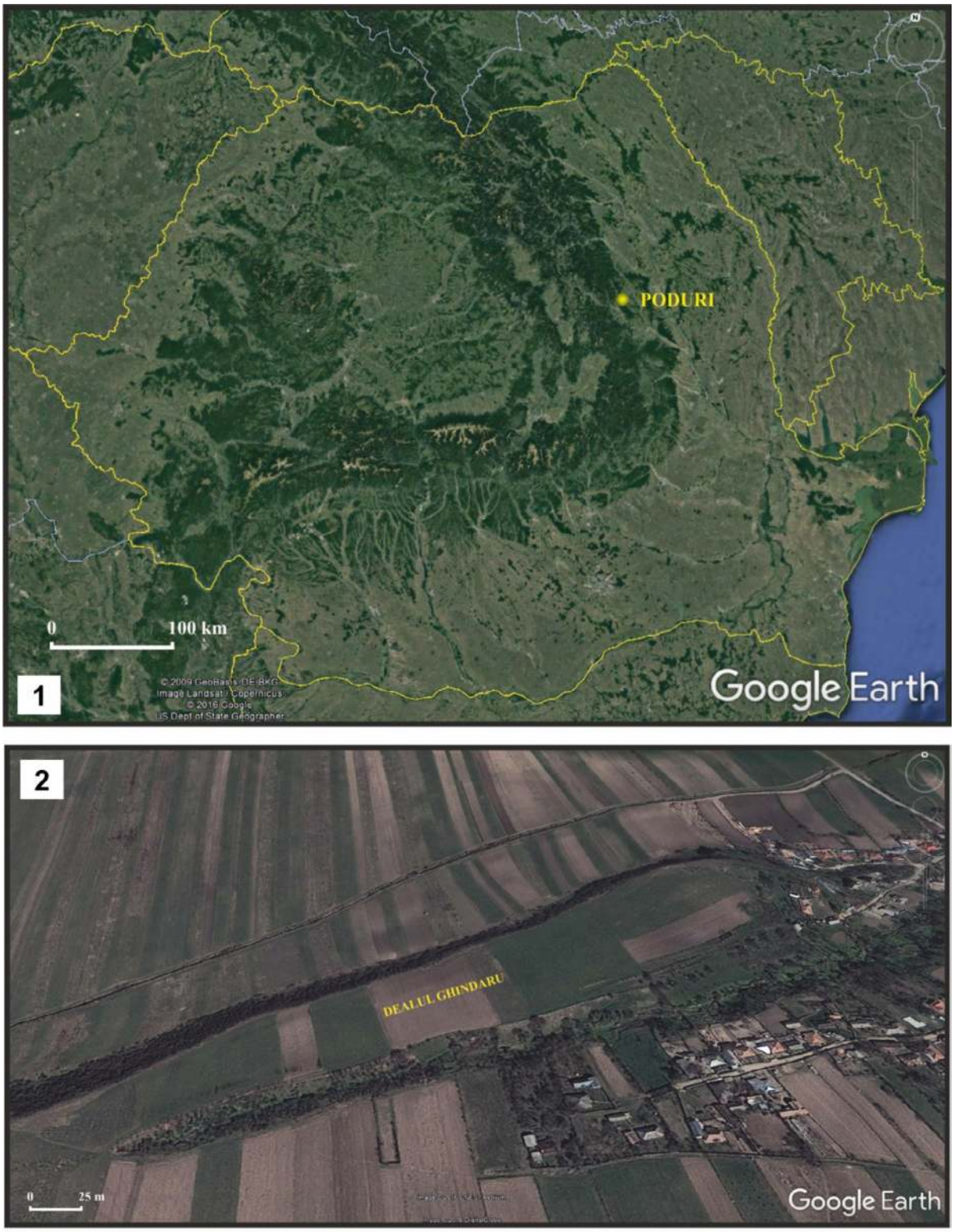

Figure 1. Poduri-Dealul Ghindaru*: 1-2 – site location.*

even conflicting information or controversies. But as we have turned our attention to these issues in another article (Preoteasa 2015: 143-149, tab. 2-3), in the present study we will refer to a different type of cucutenian artefact, represented by four ladles (Figure 2/1-4; 3/1-4) that, in our opinion, and based on their peculiarities and analogies (Figure 4/1-2), were used in the process of recrystallization of salt (production of salt).

The description of the artefacts

The four ladles (Figure 2/1-4; 3/1-4) were made of fine or semi-fine clay. Their firing was oxidizing and the colour varies from yellow-red to reddish-brown. The objects show traces of secondary burning, causing a greyish-black colour here and there. One of the objects has numerous cracks on the surface (Figure 2/4; 3/4). Two specimens have polished surfaces (Figure 2/1-2; 3/1-2), while the other two exhibit asperities (Figure 2/3-4; 3/3-4).

The scoop of the ladles has a relatively hemispherical shape, with straight or flared lips and convex bases, and with relatively cylindrical handles. Three of the objects have the handles longitudinally perforated and opening into the scoop (Figure 2/1-3; 3/1-3), and one has the handle hollowed lengthwise with an opening at the distal end, at an angle, pointing upwards (Figure 2/4; 3/4).

The presence of perforated or longitudinally hollowed handles indicates that they were the supports of longer handles, probably made of wood, which protected the users from fire and increased the effectiveness of the activities involving the ladles.

The dimensions of the objects are the following:

1. Height of the ladle – 60 mm; length of the ladle – 155 mm; diameter of the scoop – 100 mm; length of the handle – 55 mm; diameter of the handle – 35 mm (Figure 2/1; 3/1).
2. Height of the ladle – 50 mm; length of the ladle – 135 mm; diameter of the scoop – 100 mm; length of the handle – 45 mm; diameter of the handle – 50 mm (Figure 2/2; 3/2).
3. Height of the ladle – 70 mm; length of the ladle – 150 mm; diameter of the scoop – 115 mm; length of the handle – 30 mm; diameter of the handle – 30 mm (Figure 2/3; 3/3).
4. Height of the ladle – 85 mm; length of the ladle – 180 mm; diameter of the scoop – 120 mm; length of the handle – 65 mm; diameter of the handle – 50 mm (Figure 2/4; 3/4).

The context of the discoveries

All four ladles were discovered in the famous Chalcolithic *tell* from Poduri-*Dealul Ghindaru* (Poduri commune, Bacău County, Romania), located in the Tazlău - Caşin Depression of the Moldavian Subcarpathians (Figure 1/1-2), currently in the patrimony of the History and Archaeology Museum of Piatra-Neamț.

Three of them (Figure 2/1-3; 3/1-3) were fragmentary, later restored and preserved, and another is whole (Figure 2/4; 3/4). One object was found in 1981 in Section III (S. III) and it lacks a certain stratigraphic context (Figure 2/2; 3/2). Two other artefacts were found in Cassette A (Cas. A) in 1995 (Figure 2/4; 3/4) and 2000 (Figure 2/1; 3/1) and they are from outside the complex, but from certain stratigraphic contexts. The fourth object was discovered in 2007 in Complex 1 (C. 1) from Cassette C (Cas. C), more precisely in the filling of one of the two trenches dating from the Bronze Age (Figure 2/3; 3/3).

The cultural-chronological framing

The two objects (Figure 2/1, 4; 3/1, 4) discovered in certain stratigraphic contexts in Cassette A (Cas. A) belong to two different levels of habitation, dating from the Cucuteni A_2 stage.

In the case of the first ladle (Figure 2/2; 3/2), without a certain stratigraphic context, we can mention only that, statistically, most remains found in Section III are all from the Cucuteni A_2 stage.

The last item of this type (Figure 2/3; 3/3) was found in the filling of a trench from the Bronze Age, but whose inventory consisted mainly of Chalcolithic remains of Precucuteni-Cucuteni type from the disturbed dwelling levels. In this case, too, the artefacts were predominantly datable to the Cucuteni A_2 stage.

Moreover, the most consistent Chalcolithic anthropogenic deposits within the *tell* (represented by three or four levels) are from Cucuteni A_2 stage, which – on the basis of calibrated and credible radiocarbon (^{14}C) data – took place at Poduri for about 300 years, between ca. 4450-4150 BC (Preoteasa 2011: 60-63, tab. 1).

Analogies

Except one of the artefacts, which shows some typological-formal particularities, mentioned above (Figure 2/4; 3/4), the other three ladles discovered at Poduri (Figure 2/1-3; 3/1-3), relatively similar, have analogies at Provadia-*Solnitsata* (Bulgaria) (Figure 4/1-2), where there was an important centre of exploitation and commodification of rock salt during the Neo-Eneolithic in the Balkan Peninsula, which operated between 5500-4200 BC (Nikolov 2012: 11-65).

The ladles belonging to Gumelnița - Karanovo VI culture, dated between 4700-4200 BC, found at Provadia, have a particularity in the form of small protrusions at the upper part of the scoop, inside it, arranged in diametrically opposed areas (Nikolov 2012: 28, fig. 22; Weller 2012: 77, 78, fig. 12).

Functionality

Two of the objects from Poduri (Figure 2/1, 4; 3/1, 4), previously published (Monah *et al.*, 2003: 132, 189, no.

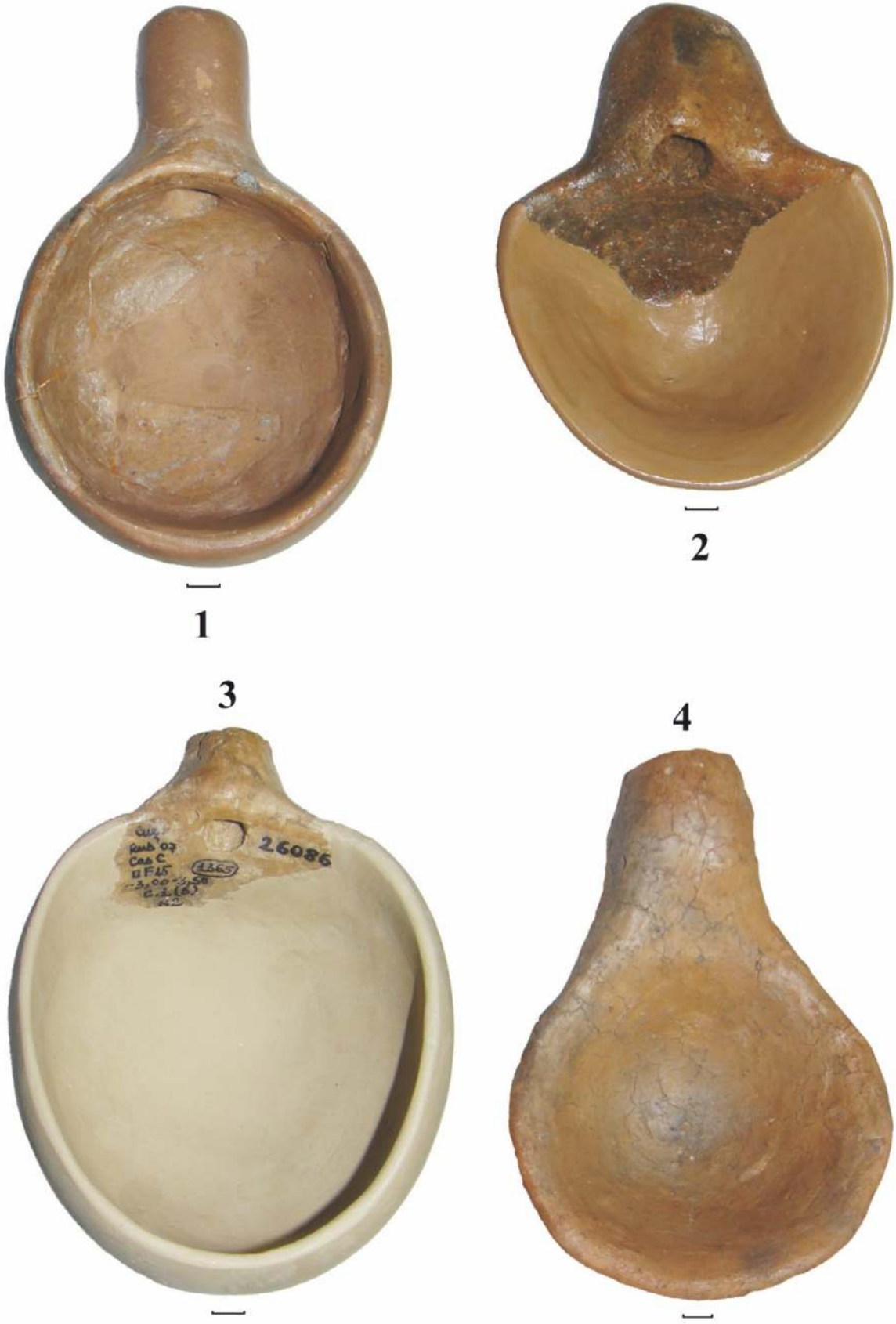

Figure 2. Poduri-Dealul Ghindaru: *1-4 – ladles for salt recrystallization (salt production) (Cucuteni A2 – ca. 4450-4150 BC)* (1-4 – photo: C. Preoteasa).

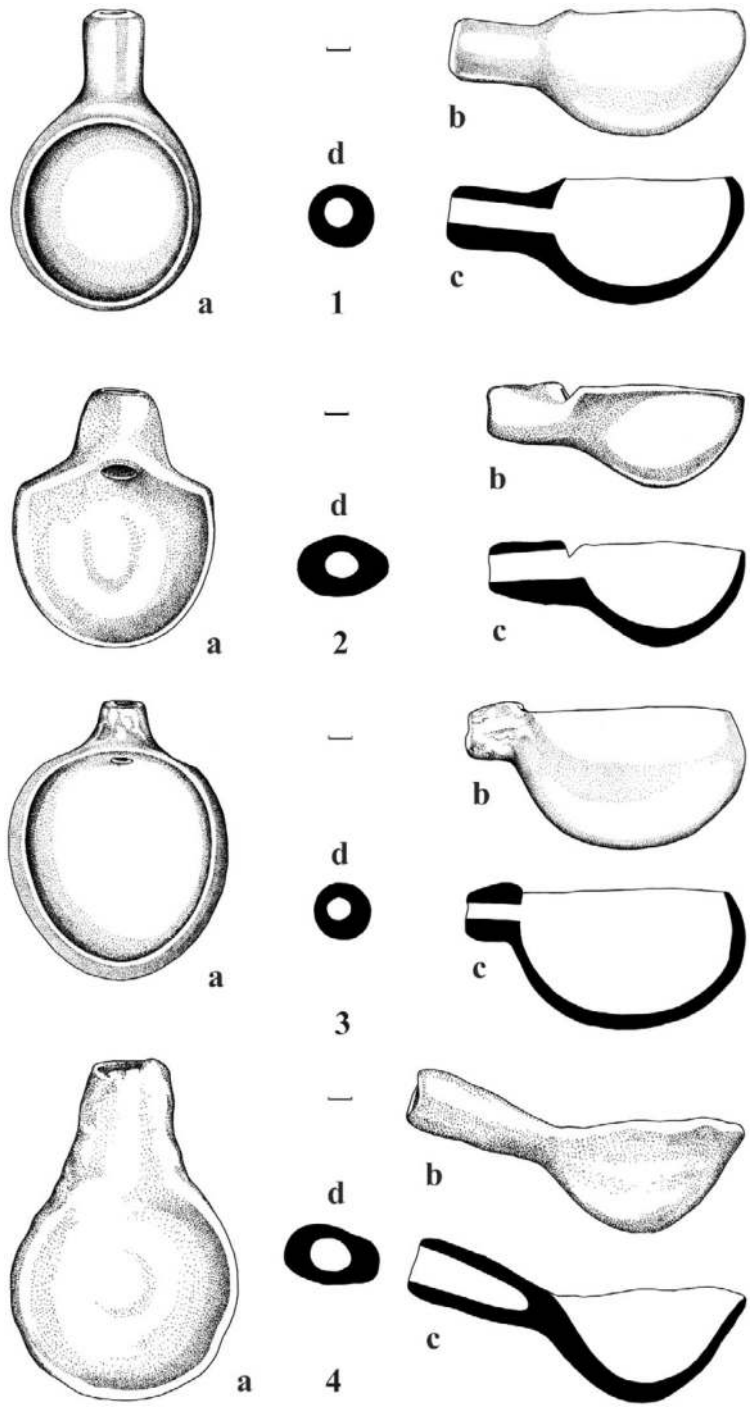

Figure 3. Poduri-Dealul Ghindaru*: 1-4 a-d – ladles for salt recrystallization (salt production) (Cucuteni A2 – ca. 4450-4150 BC)*
(1-4 – drawing: S. Trăistariu).

195-196), were presumed to have been in fact melting pots used in metallurgy. But the total absence of traces of metal on their surfaces and the features of the artefacts contradict in a categorical manner such a hypothesis.

The other two ladles (Figure 2/2-3; 3/2-3) were introduced into scientific circulation during the 2015 First International Congress on the Anthropology of Salt, held in Iași, Romania (Dumitroaia *et al.* 2015: 61, 62).

Naturally, given their characteristics and the archaeological contexts in which they have been discovered, the relatively similar objects from Provadia were, from the beginning, connected to the process of recrystallization of salt (production of salt) (Nikolov 2012: 28, fig. 22; Weller 2012: 77, 78, fig. 12).

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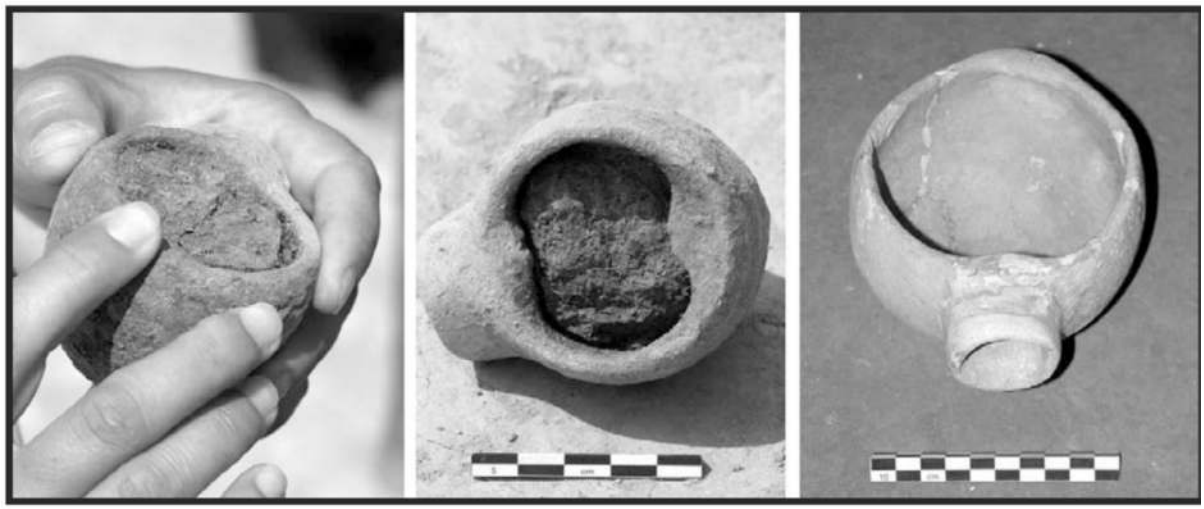

Figure 4. Provadia-Solnitsata*: 1-2 – ladles for salt recrystallization (salt production) (Gumelnița - Karanovo VI – ca. 4700-4500 BC)* (1 – apud Nikolov 2012, 28, fig. 22; 2 – apud Weller 2012, 78, fig. 12).

Conclusions

Considering: the typological-formal particular characteristics of the four ladles (Figure 2/1-4; 3/1-4), which differ clearly from typical ladles, which are often prestigious artefacts, genuine masterpieces of the cucutenian art (Figure 5/1-2); their very low frequency in the cucutenian cultural environment, being for now the only discoveries of this type; their exclusive presence in a multi-layered site located in a very rich salty area, the Tazlău - Caşin Depression of the Moldavian Subcarpathians, the salt playing a very important role for the Precucuteni-Cucuteni human communities from Poduri; the analogies from the Gumelnița - Karanovo VI culture from Provadia, another multi-layered reference site in the exploitation and valorisation of the salt during the Neo-Eneolithic in the Balkan Peninsula, we believe that the ladles from Poduri constitute artefacts dedicated exclusively to the process of recrystallization of salt (production of salt), which belong to the Cucuteni A_2 stage, being used during 4450-4150 BC. But we do not exclude the possibility that future archaeological research might lead to the discovery of other objects of this kind in settlements of the Cucuteni A phase in areas rich in sources of salt. Based on calibrated and credible radiocarbon (^{14}C) data existing today, the Eneolithic human communities of the Precucuteni-Cucuteni cultural complex settled at Poduri successively over approximately 1200 years, between 4850-3650 BC (Preoteasa 2011: 61-63, tab. 1), and the Neo-Eneolithic human communities settled at Provadia successively over approximately 1300 years, between 5500-4200 BC (Nikolov 2012: 11-65). So, we are dealing with a relationship of partial contemporaneity in terms of living in the two multi-layered sites for about 650 years, during 4850-4200 BC. Also, there is a period of partial contemporaneity between the Cucuteni A_2 stage and the Gumelnița - Karanovo VI culture, over approximately 250 years, between 4450-4200 BC.

Figure 5. Cucuteni A: 1-2 – typical ladles (1 – Poduri-Dealul Ghindaru; 2 – Izvoare-*La Izvoare)*
(1-2 – photo: C. Preoteasa).

Clearly, the Neo-Eneolithic habitat in the areas of Poduri and Provadia was decisively influenced by the existence of the rich, exploitable salt resources.

In our opinion, expressed on another occasion (Preoteasa 2015: 145, 151), the manufacture of such specialized cucutenian artefacts for the recrystallization of salt – ladles and *briquetages* – and the technological process of recrystallizing the salt itself, synonymous with the salt production actually, were exclusive to craftsmen skilled in the respective fields of activity, who have achieved such outstanding performance after numerous laborious experiments, carried out over long periods of time.

According to the present data of the archaeological investigations, the salt utilisation and valorisation by the human communities started approximately at the beginning of the 6th Millenium BC (Weller and Dumitroaia 2005), but the salt recrystallization or salt production started probably towards the middle of the 5th Millenium BC (see the previous data from Provadia and Poduri, for example).

References

Alexianu, M., Weller, O. and Brigand, R. 2007. *Izvoarele de apă sărată din Moldova subcarpatică. Cercetări etnoarheologice*. Iași, Casa Editorială Demiurg.

Alexianu, M., Weller, O. and Curcă, R.-G. (eds.) 2011. *Archaeology and anthropology of salt: a diachronic approach. Proceedings of the international colloquium, 1-5 October 2008, Al. I. Cuza University (Iași, Romania)*. Oxford, British Archaeological Reports, International Series 2198, Archaeopress.

Alexianu, M., Curcă, R.-G. and Cotiugă, V. (eds.) 2015. *Salt Effect. Second Arheoinvest symposium: From the ethnoarchaeology to the anthropology of salt, 20-21 April 2012, 'Al. I. Cuza University', Iași, Romania*. British Archaeological Reports, International Series, 2760. Oxford, Archaeopress.

Alexianu, M., Weller, O., Curcă, R-G., Brigand, R., Asăndulesei, M. (eds.) 2016. *White gold. French and romanian projects on salt in the extra-Carpathian areas of Romania*. Archaeologica & Anthropologica III. Kaiserslautern - Mehlingen, Parthenon Verlag.

Brigand, R. and Weller, O. (eds.) 2015. *Archaeology of salt. Approaching an invisible past*. Leiden. Sidestone Press.

Caliniuc, Șt., Asăndulesei, M., Curcă, R.-G. and Alexianu M.-T. (eds.) (2015). *First international congress on anthropology of salt. 20-24 August 2015, 'Al. I. Cuza' University of Iași, Iași, Romania. Book of abstracts*. Iași, Editura Universității 'Alexandru Ioan Cuza'.

Cavruc, V. and Chiricescu, A. (eds.) 2006. *Sarea, Timpul și Omul. Catalog de expoziție*. Sfântu Gheorghe, Editura Angustia.

Dumitroaia, Gh., Preoteasa, C. and Nicola, C.-D. 2015. Unique cucutenian artefacts related to salt recrystallization. In Șt. Caliniuc, M. Asăndulesei, R.-G. Curcă and M.-T. Alexianu (eds.), *First international congress on anthropology of salt. 20-24 August 2015, 'Al. I. Cuza' University of Iași, Iași, Romania. Book of abstracts:* 61-62. Iași, Editura Universității 'Alexandru Ioan Cuza'.

Fíguls i Alonso, A. and Weller, O. (eds.) 2007. *1a Trobada internacional d'arqueologia envers l'explotació de la sal a la prehistòria i protohistòria / 1r Encuentro internacional de arqueología entorno a la explotación de la sal en la prehistoria i protohistoria / 1r Meeting archéologique international sur l'exploitation préhistorique et protohistorique du sel / 1st International archaeology meeting about prehistoric and protohistoric salt exploitation, Cardona, 6-8 de desembre del 2003*. Cardona, Archaeologia Cardonensis I.

Harding, A. and Kavruk, V. (eds.) 2013. *Explorations in salt archaeology in the Carpathian zone*. Budapest, Archaeolingua.

Monah, D., Dumitroaia, Gh. and Garvăn, D. (eds.) 2008. *Sarea de la prezent la trecut*. Bibliotheca Memoriae Antiquitatis XX. Piatra-Neamț, Editura 'Constantin Matasă'.

Monah, D., Dumitroaia, Gh., Weller, O. and Chapman, J. (eds.) 2007. *L'exploitation du sel à travers le temps*. Bibliotheca Memoriae Antiquitatis XVIII. Piatra-Neamț, Editura 'Constantin Matasă'.

Morère Molinero, N. (ed.) 2007. *Las salinas y la sal de interior en la historia: economia, medioambiente y sociedad / Inland salt works and salt history: economy, environment and society*. Tom. I, Universidad Rey Juan Carlos. Madrid, Editorial Dickinson.

Nikolov, V. 2012. Salt, early complex society, urbanization: Provadia-Solnitsata (5500-4200 BC). In V. Nikolov, K. Bacvarov (eds.), *Salz und Gold: die Rolle des Salzes im prähistorischen Europa. Akten der internationaler Fachtagung (Humboldt-Kolleg) in Provadia, Bulgarien. 30 September - 4 October 2010 / Salt and Gold: the role of salt in prehistoric Europe. Proceedings of the international symposium (Humboldt-Kolleg) in Provadia, Bulgaria. 30 September - 4 October 2010*: 11-65. Provadia - Veliko Târnovo, Verlag Faber.

Nikolov, V., Bacvarov, K. (eds.) 2012. *Salz und Gold: die Rolle des Salzes im prähistorischen Europa. Akten der internationaler Fachtagung (Humboldt-Kolleg) in Provadia, Bulgarien. 30 September - 4 October 2010 / Salt and Gold: the role of salt in prehistoric Europe. Proceedings of the international symposium (Humboldt-Kolleg) in Provadia, Bulgaria. 30 September - 4 October 2010*. Provadia - Veliko Târnovo, Verlag Faber.

Preoteasa, C. 2011. Nouveaux repères chronologiques concernant l'habitation chalcolithique du tell de Poduri-Dealul Ghindaru (dép. de Bacău, Roumanie). *Studii de Preistorie* 8: 59-68.

Preoteasa, C. 2015. Salt exploitation and valorisation by the human communities of the Precucuteni-Cucuteni-Tripolye cultural complex. In M. Alexianu, R.-G. Curcă and V. Cotiugă (eds.), *Salt Effect. Second Arheoinvest symposium: From the ethnoarchaeology to the anthropology of salt, 20-21 April 2012, 'Al. I. Cuza University', Iași, Romania*: 135-161. Oxford, British Archaeological Reports, International Series 2760, Archaeopress.

Weller, O. (ed.) 2002. *Archéologie du sel. Technique et sociétés dans la Pré- et Protohistoire européenne. Actès du Colloque 12.2 du XIVe Congrès de UISPP, 4 septembre 2001, Liège et de la Table Ronde du Comité des Salines de France, 18 mai 1998, Paris / Salzarchäologie. Techniken und Gesellschaft in der Vor- und Frühgeschichte Europas. Berichte des Kolloquiums 12.2 des XIV. Kongresses der UISPP am 4. September 2001 in Liège und der Sitzung des Comité Salines de France am 18. Mai 1998 in Paris*, Internationale Archäologie, Arbeitsgemeinschaft, Symposium, Tagung, Kongress 3. Verlag Marie Leidorf, Rahden / Westf.

Weller, O. 2012. La production chalcolithique du sel à Provadia-Solnitsata: de la technologie céramique aux implications socio-économiques. In V. Nikolov and K. Bacvarov (eds.), *Salz und Gold: die Rolle des Salzes im prähistorischen Europa. Akten der internationaler Fachtagung (Humboldt-Kolleg) in Provadia, Bulgarien. 30 September - 4 October 2010 / Salt and Gold: the role of salt in prehistoric Europe. Proceedings of the international symposium (Humboldt-Kolleg) in Provadia, Bulgaria. 30 September - 4 October 2010*: 67-87. Provadia - Veliko Târnovo, Verlag Faber.

Weller, O., Dufraisse, A. and Pétrequin, P. (eds.) 2008. *Sel, eau et forêt. D'hier à aujourd'hui*. Cahiers de la MSHE Ledoux 12. Homme et environnement 1. Besançon, Presses universitaires de Franche-Compté.

Weller, O. and Dumitroaia, Gh. 2005. The Earliest Salt Production in the World: an Early Neolithic Exploitation in Poiana Slatinei-Lunca, Romania. *Antiquity* 79, 306.

The Exploitation and Control of Salt Sources from the Early Neolithic to Late Antiquity.

Case Study: Oglinzi - *Băi* Area (Neamț County, Romania)

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Abstract

It is known that the piedmont area of Eastern Romania is rich in salt sources, and many of them have been exploited in various historical stages, starting with the Early Neolithic. The authors of this paper propose a model of microzonal analysis in order to identify the exploitation parameters of the salt springs along an ample chronological span, from the Early Neolithic to Late Antiquity. The study focuses on a limited perimeter from the Moldavian Subcarpathians, respectively the Oglinzi-Băi area, from north-eastern Neamț County. There are two salt springs known for this area, in the vicinity of which many archaeological sites that fit in the mentioned time frame have been identified. This study focuses on the archaeological sites connected with the exploitation of salt sources and on the ones that controlled these resources. Because they were frequented and exploited by several prehistoric and ancient communities, the salt springs from Oglinzi can be considered a part of a complex system, based on the exchange of salt.

Keywords: salt sources, exploitation, control, Neolithic, Chalcolithic, Bronze Age, Late Antiquity, Subcarpathian Moldavia.

Introduction

The Moldavian Subcarpathian area is rich in salt sources, mostly in the form of salt springs (Munteanu and Dumitroaia 2006: 22-24; Alexianu *et al.* 2007; Weller *et al.* 2007, 2010). Their accessibility was a primary reason for the ancient communities to frequent them, in order to exploit and obtain a product indispensable for human consumption - sodium chloride (NaCl). The archaeological evidence identified so far confirms the fact that these sources were known even by the first sedentary communities, specific to the Early Neolithic (Weller and Dumitroaia 2005; Brigand and Weller 2015: 161-4). Of course, some of these springs were also exploited by other prehistoric and ancient communities, although the most intense use dates to the Eneolithic (Monah 1991, 2012; Preoteasa 2015; Ursulescu 2015). After this time, a certain decrease in use can be noticed or, perhaps, there were other means of exploitation that did not leave obvious traces, as ethnographic evidence testifies.

If for the Subcarpathian area we have a general image regarding the use of salt springs (Alexianu *et al.* 2007; Weller *et al.* 2007), microzonal studies are, nevertheless, needed. They should help establish a model of relationships between settlements and salt water sources, and also to define certain economic strategies related to the valorisation and the control of the latter. For this reason, in this study we have confined our attention to a limited geographical area with relatively well-defined borders. Also, we found it necessary to tackle a large chronological interval, from prehistory (Early Neolithic) to Late Antiquity (4th century AD), in order to identify certain parameters regarding the degree of exploitation of salt springs, or the means and possibilities of control of the areas in which these springs are found. By considering different chronological periods, we advance a type of approach whose benchmarks could be applied in similar research.

Study area

The area analysed is relatively limited and represents the northern extremity of the Moldavian Subcarpathians. We focus our attention on a micro-depression situated at the base of the eastern slope of Pleșu peak, which is an extension of the mountainous sector.

With respect to the general characteristics of the landscape, the study area is a strongly waved area, dominated by hills and crossed by several secondary streams, some even semi-permanent (Băcăuanu *et al.* 1980: 261).

From the geological point of view, Bessarabian and Aquitanian deposits provide the setting, the latter being composed of clay, sandstone, conglomerates, and salt. Elements of the saliferous Miocene are represented on the surface by numerous salt springs (Băcăuanu *et al.* 1980: 258).

Because we intend to analyse as thoroughly as possible the relationship between the salt sources and the

Figure 1. The salt springs: 1, Oglinzi-Fântâna Corugea; 2, Oglinzi-Băi (photos: V. D.).

Source	Anions					Cations			
	F (mg/l)	Br (mg/l)	Cl (mg/l)	NO_3 (mg/l)	SO_4 (mg/l)	Ca (g/l)	Na (g/l)	Mg (g/l)	K (g/l)
Oglinzi-*Băi*	0	0	21	0	4.47	0.14	9	0.04	0.03
Oglinzi-*Fântâna Corugea*	20	0	152	0	9.55	1.27	79	0.26	0.06

Figure 2. The chemical analysis of the saline water from the Oglinzi springs (after Weller et al. 2007).

prehistoric and ancient sites, we focused our attention on a limited study area. To this end, we delimited a standard perimeter with a radius of a maximum 2km, starting from the general aspect of the landscape and the location of the salt springs. We began with the premise that, through this type of approach, we can follow the territorial dynamics of the prehistoric populations, depending on the time necessary to reach the salt sources and the possibilities to supervise them. At this moment, there are two main springs known in the microzone under scrutiny: Oglinzi-*Băi* (Figure 1/2) and Oglinzi-*Fântâna Corugea* (or *Belibou*) (Figure 1/1), both with a high salinity, as shown on several occasions by chemical analyses (Weller *et al*. 2007: 157-159) (Figure 2).

The two springs are found at approximately 500m from each other, just near the mountains. The spring from Oglinzi-Băi, now captured by two modern works, one made of brick and one of concrete, is found near the source of the Slatina (or Băi) creek. The waters of the other spring, located more southwards, flow in a small affluent of the Băi creek. Nowadays, this spring is channelled in a rectangular wooden facility, less deep, with a width of 0.8m. We are not sure that in prehistoric periods the location of this spring was the same as now, considering the abundant archaeological findings occurring in this perimeter. However, the Oglinzi-Băi spring has not witnessed any major changes throughout time, meaning that the location corresponded, most probably, with the present one, especially because consistent archaeological traces have been identified in its immediate vicinity.

Beside the actual archaeological research, pedological prospections have also been made in this perimeter in order to obtain a pollen sequence than can provide information about the natural environment during prehistory. The results, unfortunately, were not relevant, the only concrete data concerning the medieval period (Weller *et al.* 2009).

Archaeological vestiges

The presence of archaeological sites and remains in the Oglinzi-Băi area has been noted since the 1980s, leading to the investigation of the area by means of several trial excavations that have revealed traces of habitation encompassing a chronological interval from the Early Neolithic to the end of the Bronze Age (Dumitroaia 1992: 85-86, 1994: 75-78, 2015: 43; Monah and Dumitroaia 2007: 22, Fig. 8) (Figure 3).

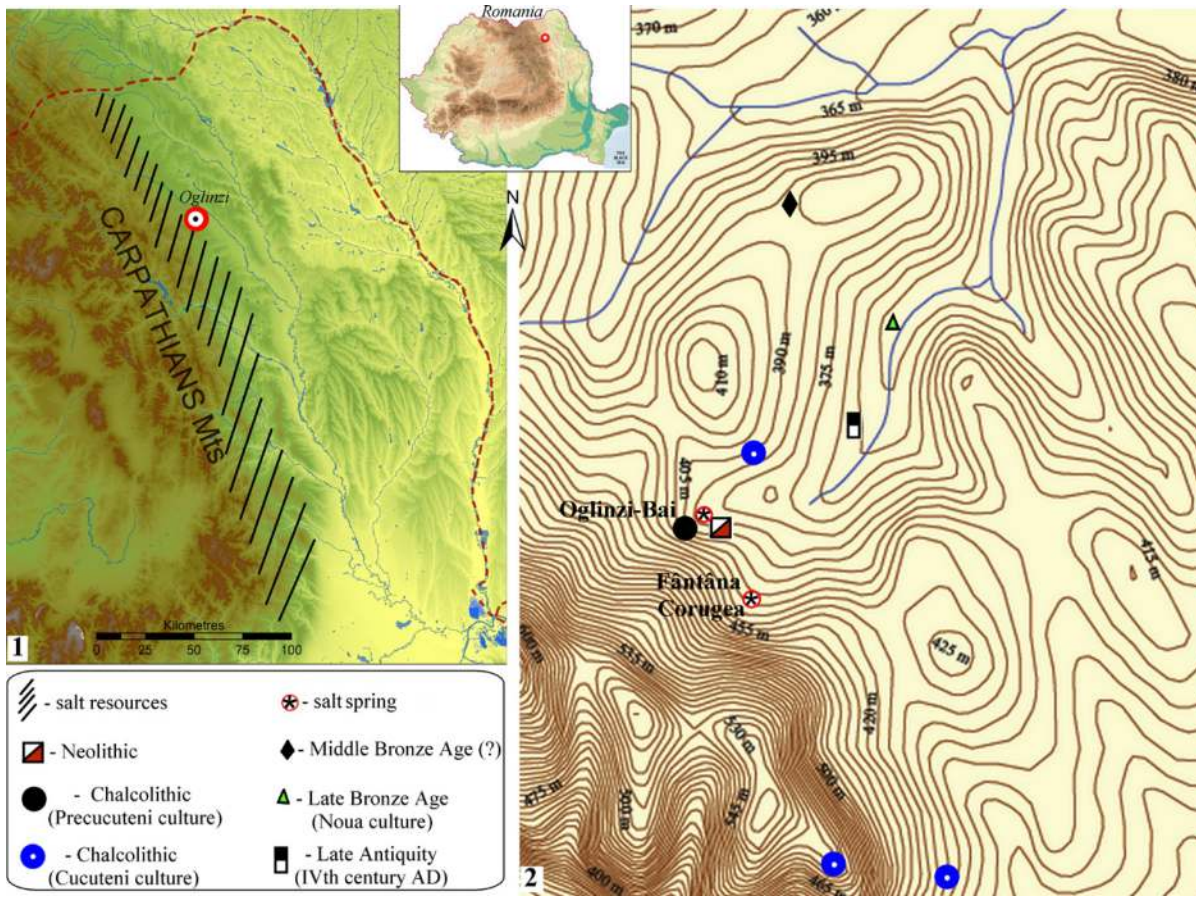

Figure 3. The salt springs and the archaeological sites from the study area.

In our study we present two distinct groups of sites, namely those found in the immediate vicinity of the salt springs and that can be connected with possible exploitation activities, and, respectively, a second category, formed by the settlements that could have controlled the salt springs.

In order to have an overall picture, we will present a short summary of each site, starting with those found near the salt sources. We should mention that some of the settlements have already been treated in the archaeological literature (Dumitroaia 1992, 1994; Diaconu and Dumitroaia 2016), but we will introduce here our unpublished discoveries.

As we have already mentioned, prehistoric archaeological remains have been identified only near the salt spring from Oglinzi-Băi, with the oldest belonging to the Early Neolithic (Starčevo-Criș culture). These were found at approximately 100m from the present-day salt spring (Băi II after Dumitroaia 1994) by a trial excavation that showed that the Neolithic remains were found at -1.35m below ground. The archaeological level, rather consistent (0.5m thick), was formed by corroded ceramic fragments, ash, and charcoal. The ceramic assemblage, poorly preserved, consists of pottery fragments of large or medium sizes, which, based on their morphology and on the decoration, can be attributed to the Starčevo-Criș culture (Dumitroaia 1994: 78) (Figure 4/1-5).

A second site was identified in the immediate vicinity of this archaeological point (Băi I after Dumitroaia 1994), partially located in a forested area and affected by alluvia washed down the slopes. Four sections established elements of stratigraphy, which can be summarized as follows: at -1.10m there is a clay layer, archeologically sterile, topped by an inconsistent greyish-brown layer, containing charcoal fragments and small ceramic fragments, corroded (probably from the Early Neolithic). The next archaeological layer, with a structure similar to the one below it, was clearly assigned to the Precucuteni culture, phase II. Though rather fragmented, the Precucutenian ceramic material allows nonetheless the reconstruction of a number of specimens, dating to the middle phase of the Precucuteni culture (Dumitroaia 1994: 77; Garvăn 2013: 50) (Figure 4/6-10).

Also in the proximity of the salt spring from Oglinzi-Băi, on the south-western slope of Rotăriei Hill, there has been identified, through surface research, a

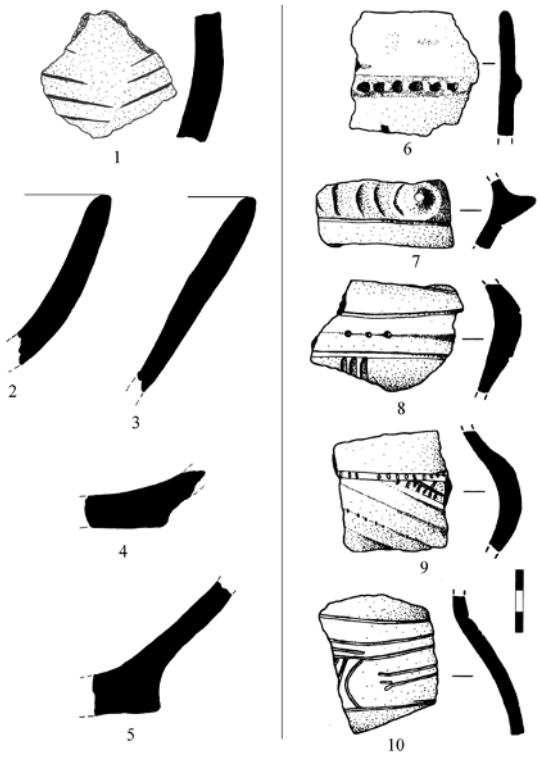

Figure 4. Archaeological materials from the Early Neolithic (1-5) and Chalcolithic (6-10, after Garvăn 2013).

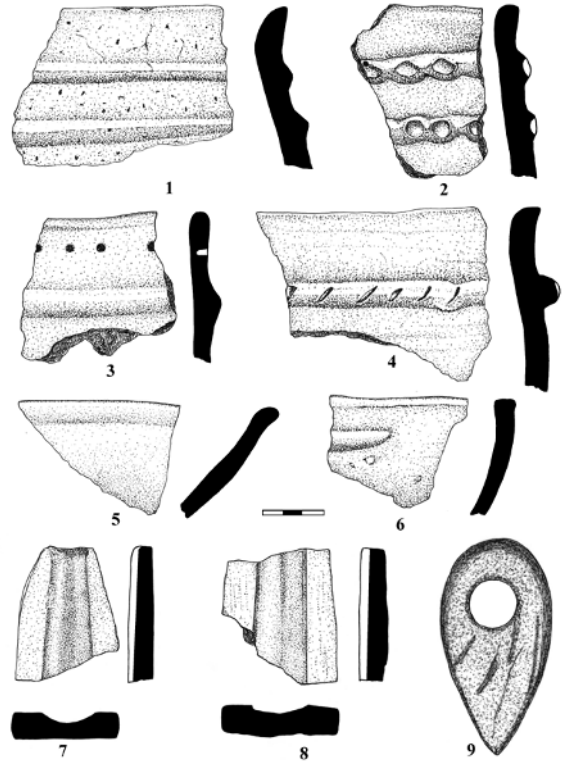

Figure 5. Archaeological materials from the Late Bronze Age.

settlement specific to the B phase of Cucuteni culture (Dumitroaia 1992: 86). The very short distance between this settlement and the salt spring constitutes a good argument for the idea that the Chalcolithic community controlled and exploited the natural source found close by.

On Rotăriei Hill, in the point called Fața Slatinei, there is also a site attributed to the Late Bronze Age (Noua culture). The settlement, with a surface of approximately 1ha, occupies a portion of the hill's south-eastern slope, on the right bank of the Slatina (or Băi) creek. The site was partially researched in 1989, revealing important habitation remains from during the end of the Bronze Age. The distance between this settlement and the salt spring from Oglinzi-Băi is approximately of 600m (Dumitroaia 1992: 86-87; Diaconu and Dumitroaia 2016).

The excavations made in the abovementioned site produced various archaeological materials, but the most important are the ceramics (Figure 5). An analysis of the main ceramic forms warrants the possibility that many of the vessels were used for storing and transporting brine from the nearby springs. The fact that in the settlement there have been found objects manufactured from volcanic rocks (axes) and also moulds for metallic items suggests that this community was involved in a complex exchange network of goods/ raw materials, including salt.

Because of their short distances from the salt sources, the sites presented above can be considered points of exploitation, but in our study area we believe there is a series of archaeological sites that also exerted a certain control over the salt springs.

For instance, the Cucutenian settlement from Târgu Neamț-Dealul Pometea, found at approximately 2km south-east of the Oglinzi salt springs, can be included in this category. Through its topographic position, this settlement dominated a great part of the Neamț Depression and also the communication routes with the valley of the Moldova River (Preoteasa *et al.* 2007).

Recently, through surface surveys conducted in our study area, a new archaeological site has been found at 1.6km south-east from the salt spring of Oglinzi-Băi, in the elevated sector of the Rotăriei Hill. The fact that this settlement is located on an area with good visibility towards the valley of the Moldova Riverand also towards the area in which the salt sources are, constitute good arguments that the respective community oversaw access to and from the salt springs. The archaeological vestiges, represented by ceramics and lithics, belong to a stage of the Middle Bronze Age.

To the aforementioned sites we also add a settlement specific to the 4th century AD from Oglinzi-Dealul Rotăriei, found 1.4km east of the Oglinzi-Băi spring. The

site, attributed to the Sântana de Mureș-Černjachov culture, occupies a tight perimeter at the base of Rotăriei Hill. Surface examinations revealed the presence of some light constructions made of wood and clay, from the perimeter of which characteristic ceramic material was collected (Diaconu 2010: 428).

We reviewed the sites from the proximity of the salt springs from Oglinzi to lay the ground work for a discussion about the exploitation and management of this resource by the communities that were situated in its proximity, and also to discuss their microzonal importance.

A zonal economic system based on salt exploitation?

Salt sources have constituted, during all the stages of ancient history, genuine points of interest for human communities. The need to obtain a mineral that is indispensible to humans and also to animal alimentation prompted specialisations in the exploitation of these resources. For this reason, many salt springs witnessed the discovery in their vicinities of archaeological remains that suggest activities of salt crystallization by boiling brine in clay pots. This can also be observed, implicitly, in the case of the Oglinzi-Băi salt spring, in whose proximity there have been found vestiges that suggest an intense exploitation of this resource. Of course, for the northern area of the Moldavian Subcarpathians, the salt springs from Oglinzi are part of a larger series of sites that include the springs from Lunca-Poiana Slatinii (Dumitroaia 1987, 1994, 2000, 2001, 2015) and Țolici-Hălăbutoaia (Dumitroaia et al. 2008). Their common point is their exploitation during the Early Neolithic and the Early Chalcolithic. From this point of view, in the case of the discoveries from Oglinzi, a number of considerations must be made. As previously mentioned, Early Neolithic (Starčevo-Criș culture) remains have been found in the vicinity of the salt spring from Băi. By analysing these discoveries within a larger, regional scale, we observe that there are no known Starčevo-Criș settlements in the area; the closest is Grumăzești-Deleni (Marinescu-Bîlcu 1975; Marinescu-Bîlcu and Beldiman 2000), found approximately 9km to the south. Starting from this detail, but in close connection with the discoveries from Lunca and Țolici, we consider that the springs from Oglinzi were also part of a complex system, tightly controlled by the Neolithic populations of the Subcarpathian area. The fact that the site from Grumăzești is located a relatively small distance from the salt sources at Țolici, which could have been easily exploited, makes us believe that the springs from Lunca and Oglinzi were not necessarily in the sphere of interest of the aforementioned community (if we also take into consideration the criterion of distance), and that they were managed by groups that were integrated into a long-distance supply/exchange system.

The situation is slightly different in the case of the Early Chalcolithic, in the sense that the Precucuteni settlements were more numerous in the northern part of the Moldavian Subcarpathians. At Oglinzi, there are remains from the middle phase of the Precucuteni culture, but no contemporary settlement has been found in its vicinity, a situation that can be explained, as in the case of the Starčevo-Criș culture, by the regional importance of this saline. The nearest phase II Precucutenian sites are found in the Neamț Depression, at approximately 8-10km to the south (Diaconu 2012: 64-69).

With respect to the Cucuteni culture in Oglinzi, we do not yet have proof for the exploitation of the salt springs, but in the immediate vicinity there is a settlement from the last phase of this Chalcolithic culture, which may have valorised these resources. The Cucutenian settlement dynamics were expansive such that within a radius of 5km around the salt springs at Oglinzi, there are many known Chalcolithic settlements, including fortified ones, which controlled important access routes. An important detail is the fact that in the Cucutenian site from Răucești-Munteni, located ca. 5km away, briquetage remains have been found (Munteanu 2006: 201-202), which should be connected with the nearby salt sources, either those from Oglinzi or even from Lunca.

A detail that must be stressed is that the Cucuteni B settlement from Rotăriei Hill could have been contemporary, at least in part, with the site from Târgu Neamț-Dealul Pometea and with another, found relatively close, from Târgu Neamț-Dealul Gol (Matasă 1940: 126; Monah and Cucoș 1985: 153), both attributed to the last stage of development of the Cucuteni culture. All these could have framed an efficient system of control over the areas rich in salt.

The Bronze Age discoveries also confirm that the salt springs from Oglinzi represented points of interest for the communities of the period. If the remains specific to the Middle Bronze Age still require careful analysis, the Late Bronze Age settlement from Oglinzi-Fața Slatinei is part of a larger group of sites specific for this chronological segment. This high number of settlements in areas rich in salt is explained precisely by the necessity to supply them with this mineral. The attractiveness of the salt springs from Oglinzi, and of those from Lunca, is confirmed by the number of settlements belonging to the Noua culture identified on the valley of the Sarata creek, a right-bank affluent of the Moldova River (Diaconu 2011; 2015: 202, Fig. 4).

Salt exploitation in Late Antiquity of the Moldavian Subcarpathian area is not very well documented. Material evidence has been found in the site from Lunca-Poiana Slatinei (Dumitroaia 2001: 32), but it

is safe to assume that the other salt sources were known by the populations of that period. In the Oglinzi microzone, the number of sites from the 4th century AD is not very large, but the respective populations probably exploited, besides other habitat elements, the salt sources, too.

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Certainly, the need for salt and, implicitly, the degree of exploitation of the salt sources varied from one chronological stage to another, but also depending on the economic profile of each society. Proximity to salt springs facilitated supplying brine, while the practice of obtaining crystallized salt is documented for certain time periods, producing a valuable commodity that was the object of long distance exchanges. Although the details of the management of these resources are not known, the prehistoric and ancient populations gravitated to them, both in order to exploit and to control them. Not incidentally, some of these settlements, specific to the Chalcolithic and the Bronze Age, occupied dominant positions that commanded wide tracts of land, as part of a strategy for an efficient use of the local resources.

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References

Alexianu, M., Weller, O., Brigand, R. 2007. *Izvoarele de apă sărată din Moldova Subcarpatică. Cercetări etnoarheologice*. Iaşi, Casa Editorială Demiurg.

Băcăuanu, V., Barbu, N., Pantazică, M., Ungureanu, A. and Chiriac, D. 1980. *Podişul Moldovei*. Bucureşti, Editura Ştiinţifică şi Enciclopedică.

Brigand, R., Weller, O. 2015. Spatial analysis for salt archaeology: a case study from Moldavian Neolithic (Romania). In R. Brigand and O. Weller (eds.), *Archaeology of salt. Approaching an invisible past*: 157-179. Leiden, Sidestone Press.

Diaconu, V. 2010. Noi situri arheologice în zona de nord-est a judeţului Neamţ. *Memoria Antiquitatis* XXV-XXVI, (2008-2009): 417-435.

Diaconu, V. 2011. Comunităţi umane din bronzul târziu în Subcarpaţii Moldovei. Observaţii privitoare la dinamica teritorială. *Cercetări Istorice* XXVII-XXIX, Serie nouă, (2008-2010): 45-66.

Diaconu, V. 2012. *Depresiunea Neamţ. Contribuţii arheologice*. Piatra Neamţ, Bibliotheca Memoriae Antiquitatis XXVIII.

Diaconu, V. 2015. Sources of Salt and the Territorial Dynamics of Late Bronze Age Communities in the Northern Moldavian Subcarpathian Region. In M. Alexianu, R. G. Curcă and V. Cotiugă (eds.), *Salt Effect. Second Arheoinvest Symposium from the Ethnoarchaeology to the Anthropology of Salt*: 199-205. British Archaeological Reports, International Series 2760. Oxford, Archaeopress.

Diaconu, V. and Dumitroaia, G. 2016. The Oglinzi-Faţa Slatinei Settlement (Neamţ County, România) of the Late Bronze Age and Several Observations Regarding the Control of the Salt Resources. In A. Zanoci, E. Kaiser, M. Kashuba, E. Izbitser and M. Băţ (eds.), *Mensch, Kultur und Gesellshaft von der Kupferzeit bis zur Frühen Eiseizeit in Nördlichen Eurasien. Beiträge zu ehren uzum 60. Geburtstag von Eugen Sava*: 203-214. Chişinău, Tyragetia International.

Dumitroaia, G. 1987. La station archaéologique de Lunca-Poiana Slatinii. In M. Petrescu-Dîmboviţa, N. Ursulescu, D. Monah and V. Chirica (eds.), *La civilisation de Cucuteni en contexte européen:* 253-258. Iaşi, Bibliotheca Archaeologica Iassiensis, I.

Dumitroaia, G. 1992. Materiale şi cercetări arheologice din nord-estul judeţului Neamţ. *Memoria Antiquitatis* XVIII: 63-143.

Dumitroaia, G. 1994. Depunerile neo-eneolitice de la Lunca şi Oglinzi, judeţul Neamţ. *Memoria Antiquitatis* XIX: 7-82.

Dumitroaia, G. 2000. *Comunităţi preistorice din nord-estul României. De la cultura Cucuteni până în bronzul mijlociu*. Piatra Neamţ, Bibliotheca Memoriae Antiquitatis VII.

Dumitroaia, G. 2001. Sat Lunca, com. Vânători-Neamţ, jud. Neamţ. In V., Cavruc, Gh., Dumitroaia (eds.), *Cultura Costişa în contextul epocii bronzului din România*: 31-40. Piatra Neamţ.

Dumitroaia, G. 2015. Archaeological Research in the Salt Springs Area of Lunca and Oglinzi (Neamț County, Romania). In Ş. Caliniuc, M. Asăndulesei, R. G., Curcă, M. T. Alexianu (eds.), *First International Congress on the Anthropology of Salt. 20-24 August 2015 'Al. I. Cuza'University of Iași, Romania. Programme and Abstracts*: 41-44. Iași, Editura Universității 'Alexandru Ioan Cuza' din Iași.

Dumitroaia, G., Munteanu R., Garvăn, D., Diaconu, V. and Brigand, R. 2008. Un nou punct de exploatare a apei sărate în preistorie: Ţolici-Hălăbutoaia. In D., Monah, Gh., Dumitroaia, and D. Garvăn (eds.), *Sarea, de la prezent la trecut*: 203-224. Piatra Neamţ, Bibliotheca Memoriae Antiquitatis XXX.

Garvăn, D. 2013. *Contribuţii la cunoaşterea culturii Precucuteni*. Piatra Neamţ, Bibliotheca Memoriae Antiquitatis XXX.

Marinescu-Bîlcu, S. 1975. Asupra unor probleme ale culturii Criş. *Studii* şi *Cercetări de Istorie Veche* şi *Arheologie* 26, 4: 487-506.

Marinescu-Bîlcu, S., Beldiman, C. 2000. Industria materiilor dure animale în cadrul culturii Starčevo-

Criș pe teritoriul României. Aşezarea de la Grumăzeşti, judeţul Neamţ. *Memoriae Antiquitatis* XXI: 273-295.

Matasă, C. 1940. Cercetări din preistoria judeţului Neamţ. *Buletinul Comisiunii Monumentelor Istorice* 97, (1938).

Monah, D. 1991. L'exploitation du sel dans les Carpates Orientales et ses rapports avec la culture de Cucuteni-Tripolye. In V. Chirica and D. Monah (eds.), *Le Paléolithique et le Néolithique de la Roumanie en context européen*: 387-400. Iași, Bibliotheca Archaeologica Iassiensis IV.

Monah, D. 2012. L'approvisionnement en sel des tribus chalcolitiques sédentaires et des tribus des steppes du Nord de la mer Noire. In V. Nikolov and K. Bacvarov (eds.), *Salz und Gold: die Rolle des Salzes im prähistorischen Europa / Salt and Gold: The Role of Salt in Prehistoric Europe*: 127-141. Provadia-Veliko Tarnovo.

Monah, D., Cucoș, Șt. 1985. *Așezările culturii Cucuteni din România*. Iași, Editura Junimea.

Monah, D. and Dumitroaia, G. 2007. Recherches sur l'exploitation préhistorique du sel en Roumanie. In D. Monah, Gh. Dumitroaia, O. Weller and J. Chapman (eds.), *L'exploitation du sel à travers le temps:* 13-34. Piatra Neamț, Bibliotheca Memoria Antiquitatis XVIII.

Munteanu, R. 2006. Fişe catalog. In V. Cavruc and A. Chiricescu (eds.), *Sarea, timpul* și *omul*. Sfântu Gheorghe, Angustia.

Munteanu, R., Dumitroaia, G. 2006. Sursele de sare dintre Valea Sucevei și Valea Buzăului. In V. Cavruc and A. Chiricescu (eds.), *Sarea, timpul* și *omul*: 22-24. Sfântu Gheorghe, Angustia.

Preoteasa, C. 2015. Salt Exploitation and Valorisation by the Human Communities of the Precucuteni - Cucuteni - Tripolye Cultural Complex. In M. Alexianu, R. G. Curcă and V. Cotiugă (eds.), *Salt Effect Second Arheoinvest Symposium: From the ethnoarchaelogy to the anthropology of salt, 20-21 April 2012, 'Al. I. Cuza' University, Iași, Romania*: 135-162. British Archaeological Reports, 2760. Oxford, Archaeopress.

Preoteasa, C., Munteanu, R., Nicola, D. and Dumitroaia, G. 2007. Cercetările arheologice de la Târgu Neamț-Dealul Pometea. *Memoria Antiquitatis* XXIV: 291-327.

Ursulescu, N. 2015. The Role of the Salt Supply in the Location of Neolithic and Eneolithic Settlements in Moldavia (Romania). In M. Alexianu, R. G. Curcă and V. Cotiugă (eds.), *Salt Effect Second Arheoinvest Symposium: From the ethnoarchaelogy to the anthropology of salt, 20-21 April 2012, 'Al. I. Cuza' University, Iași, Romania*: 121-124. British Archaeological Reports, 2760. Oxford, Archaeopress.

Weller, O. and Dumitroaia, G. 2005. The earliest salt production in the world. An early Neolithic exploitation in Poiana Slatinei-Lunca, Romania. *Antiquity* 79: 306.

Weller, O., Brigand, R. and Alexianu, M. 2007. Cercetări sistematice asupra izvoarelor de apă sărată din Moldova. Bilanțul explorărilor din anii 2004-2007 efectuate în special în județul Neamț. *Memoria Antiquitatis* XXIV: 121-190.

Weller, O., Dumitroaia, Gh., Sordoillet, D., Dufraisse, A., Gauthier, E. and Munteanu, R. 2009. Lunca-Poiana Slatinei (jud. Neamț): Cel mai vechi sit de exploatare a sării din preistoria europeană. Cercetări interdisciplinare. *Arheologia Moldovei* 32: 21-39.

Weller, O., Brigand, R. and Alexianu, M. 2010. Recherches systématiques autour des sources salées de Moldavie. Bilan de prospections 2008-2010. *Memoria Antiquitatis* XXV-XXVI, (2008-2009): 437-504.

A Tiny Story about Salt, Herding and Landscape in Chalcolithic and Late Bronze Age Eastern Romania

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Abstract

A story in just three words about novel discoveries from the Bistrița-Cracău watershed may represent the beginning of a transdisciplinary research. This would have the objective of capitalizing certain surface archaeological research to set up a coherent story about the use of salt sources by some of the communities in the Chalcolithic (4600-3500 BC) and the Late Bronze Age (1600-1100) from the study area. Through field survey conducted in 2015-2017 we managed to identify dwelling structures dated to the Chalcolithic period and *zolniki*/ash-heaps specific to the Late Bronze Age (LBA) east of the Carpathians. Of the investigated area, we extracted miscellaneous archaeological material encompassing pottery, adobe, stone objects and osteoarchaeological remains.

The need to develop this topic is supported by a significant number of faunal remains and the proximity of the brine sources situated north of Slatina Negrițești, Neamț County. The archaeozoological analysis of the LBA settlements of Cracău-Bistrița basin suggests the long-range pasturing of cattle (*Bos taurus*) — this species dominates, with on average, 73% of identified debris. Of the entire bone material, there is to be noted the presence of processed bones, most of them from domestic bovine shoulder blades.

To these data we will add the observations made based on the study of media sources, cartographic sources, toponymy, hydronymy and some other data about the referred salt source. The information will be integrated into a model regarding the organization and the use of the landscape by some Chalcolithic communities and the herders from LBA within the Cracău-Bistrița watershed.

Keywords: salt sources, prehistory, spatial analyses, Eastern Romania.

Introduction

The ways we can investigate an ancient habitational sequence today are numerous and diverse, making it possible to better explore areas previously overlooked. This is what motivated us to expand the research plan to include new areas for investigation.

The initiative was supported by the recent results regarding the exploitation of some salt sources in Eastern Romania, in the Cracău-Bistrița watershed (Figure 1). The possibility to integrate new sources of information encouraged us to evaluate the state of knowledge for the LBA in the area, as to arrive to a clearer scenario. Moreover, the results support our intentions: to set up an integrated approach (archaeology, archaeozoology, environmental analysis, spatial analysis), to better understand the story of a place that has been frequented for millennia. Generally, an approach concerned with the identification and research of the sites from a multidisciplinary perspective was applied to the Cucuteni culture (Alexianu *et al.* 2011: 7-8; Monah 1991; Monah 2002; Weller *et al.* 2008a; Weller *et al.* 2008b). Different studies were dedicated to an integrated approach to include data about brine exploitation during historic times (Alexianu *et al.* 2014). Other periods that spanned prehistoric or historic times did not benefit from the same attention. With this in mind, our goal was to update the existing documentation with information about the geometry of place in the Chalcolithic and the LBA, especially since there is a close connection between the living space, the salt sources, and animal husbandry.

Methodology

In order to reach these objectives, the priority was to examine an area that was understood very little. Geographically, it includes the hydrographic basins of Verdele, Vârlani and Cărbunești rivers situated on the left bank of the Bistrița river. The results were favorable; during the investigation we managed to locate several new sites in the proximity of the salt springs. Similar discoveries, dated to the Chalcolithic, had already been integrated in the archaeological discourse by the *local salt establishment*. However, the same was not available for other periods in Prehistory.

Given the challenge, we took the initiative of including the findings from the Late Bronze Age into a new story about salt in Prehistory. Some further basic criteria had

to be met to ensure a clear representation and display of the data and the archaeological information:

a. delimitation of the study area
b. evaluation of the specific documentation
c. field survey in different periods of the year and mapping of the sites
d. archaeozoological analysis (LBA study case)
e. attempts at spatial analysis. The purpose is to extract the data that indicates behavioural patterns specific to Chalcolithic and to the LBA.

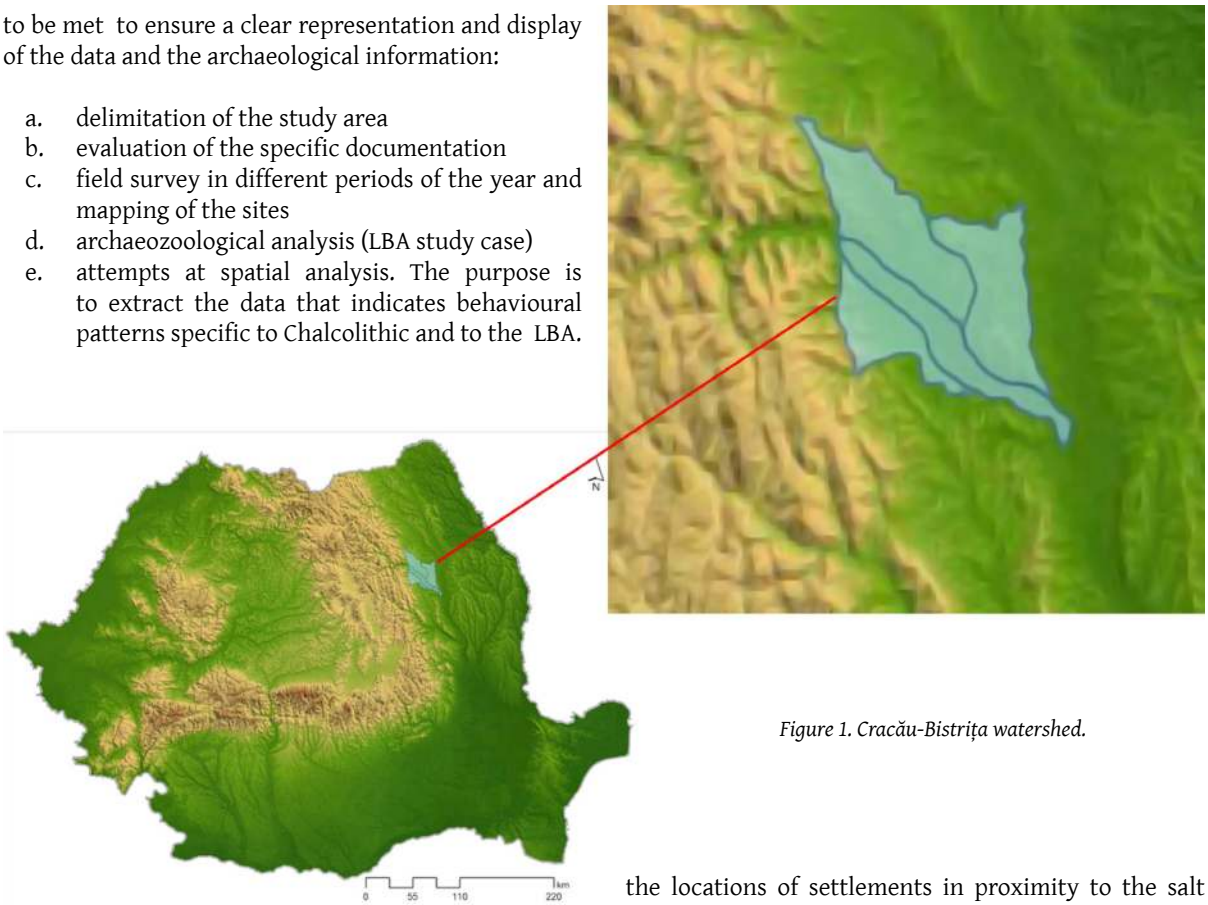

Figure 1. Cracău-Bistrița watershed.

Area of study

In the current approach, the team chose to identify an area which, by its geographical and cultural characteristics, could represent a specific behavioral standard for the Chalcolithic (Cucuteni culture) and Late Bronze Age (Noua culture) communities located on the outskirts of the Eastern Carpathians (Figure 2).

In this context, the Cracău-Bistrița watershed, with its open aspect to the east and south, favors the circulation of communities and goods.

The Cracău-Bistrița basin is a key component for the representation of prehistoric communities' lives and of their interaction with the environment. The first step of the investigation was to mark the unit of interest.

Positioned to the centre-south of the wider area, the unit exhibits a longitudinal drainage pattern formed by the rivers Bistrița and Cracău. These two main rivers and their tributaries shaped the landscape contributing to the favorable natural conditions for living. Maybe not by chance, the archaeological sites attributed to the Chalcolithic and Late Bronze Age are located either close to the river beds or close to sources of salt springs (Figure 3). In support of these hypotheses are the locations of settlements in proximity to the salt spring from Negrițești village (Dumitroaia 1992: 293-294; Dumitroaia 2004: 441). Traces of habitation from different periods of the Chalcolithic have been found 2.6 km south, at Negrițești-*Movila Flocoasă* (Dumitroaia 1994: 517-518 and field survey Neculai Bolohan, March 2017). The brooks Celacul, Verdele, Cârbunești and Vârlani make up the hydrographic network of the area. The middle river basin shows signs of past human activity around marshes or ponds.

A defining trait of the unit is the presence of salt springs, such as those from Negrițești *Slatina/Slatina Mare* and Hoisești *Slătio(a)ra/Slatina Mică* (Weller *et al.* 2007: 141; 156-157). The salt spring from Negrițești is located 2.07 km east of the crossroad between DJ 157 J and the road towards the local cemetery and is considered to be one of the most productive even today (Weller *et al.* 2011: 78). The salt spring from Hoisești is situated 1.5 km south-southeast from the crossroad of DJ 157 with DJ 157 J, from the center of Hoisești village. More brine springs or chlorinated waters lie also to the south and north of the above mentioned ones. These sources are still exploited today; however, traces of past human activity have not been detected.

According to the taxonomic scheme of pedogeographic division, the study area is included in the Ștefan cel Mare-Buhuși district, situated in the east-central part of the Cracău-Bistrița basin. The prevailing soil types

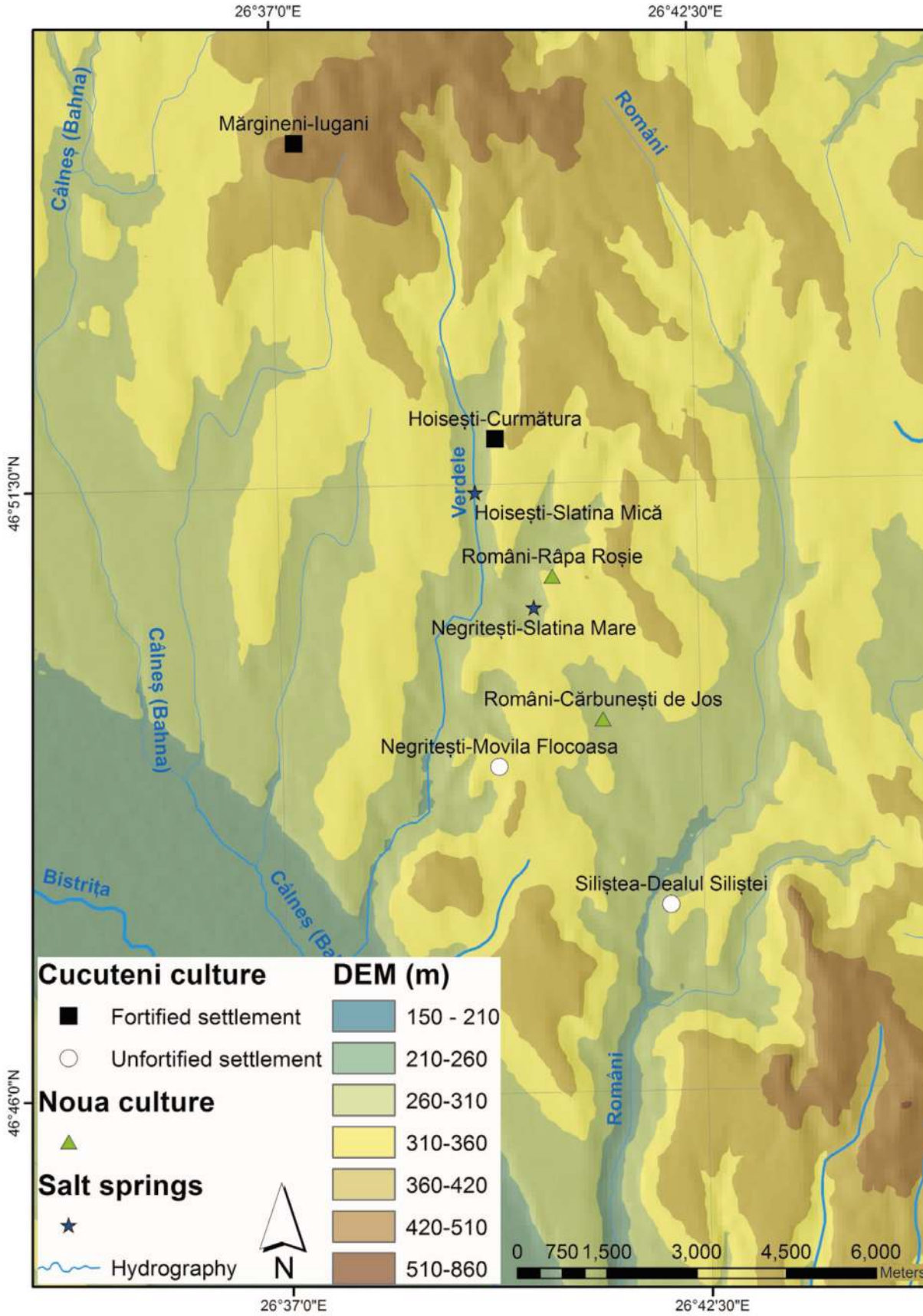

Figure 2. Chalcolithic (Cucuteni culture) and LBA (Noua culture) discoveries within the area of study.

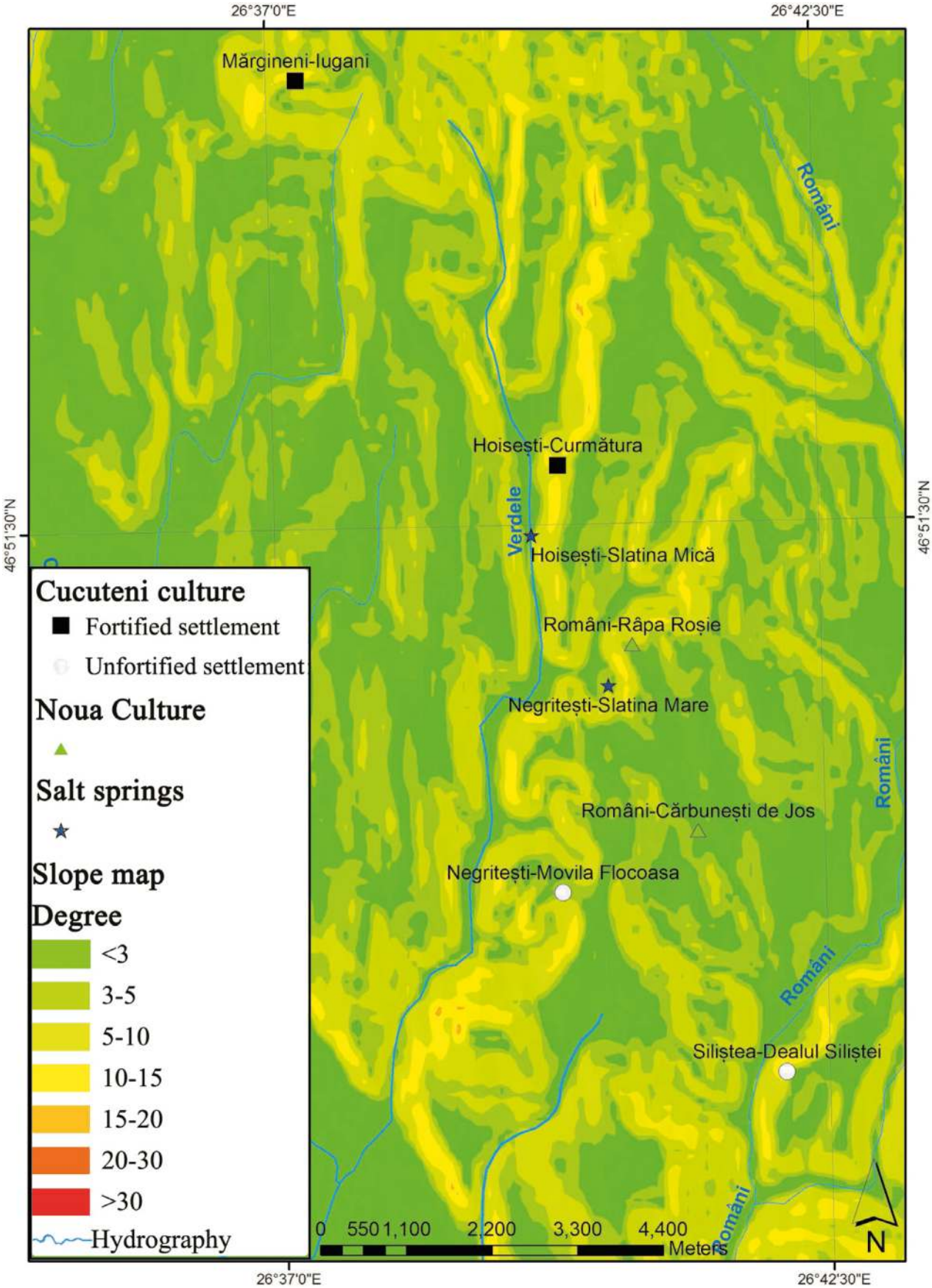

Figure 3. Chalcolithic (Cucuteni culture) and LBA (Noua culture) settlements and the representation of the slope degrees.

are the mollisols represented by different types of chernozem. The highly permeable surface deposits impede the accumulation of water in excess. However, the same is not available for the Români-Buhuși division, where the surface is almost flat. The intense agricultural activity affected the soils to the extent that they stopped evolving to the same conditions attained in the rest of the basin (Lupașcu 1996: 158-160).

A brief evaluation of the sources

The central and eastern part of the Cracău-Bistrița basin benefitted from archaeological attention. For example the localities of Bălușești, Dochia, Doina, Piatra Neamț and Ștefan cel Mare are included in essays concerned with the monuments of the LBA. The same is not available for the study area, as similar discoveries were not recorded (Zaharia *et al.* 1970; Florescu 1991; Cucoș 1992; Dumitroaia 1992). The only data available concerns the Negrițești area. Here, field survey was carried out in vicinity of the *Slatina Mare* site. The archaeological material typologically dates to the IV-III B.C (Dumitroaia 1992: 293-294). The other field survey was carried out to the south of the village, reference point *La Lipoveni*, at the junction of a little brook with the Verdele brook (Dumitroaia 1992: 293-294). Having considered this, the efforts were met with results. In the last 20 years, we successfully initiated the research of a number of sites from the southern part of the Cracău-Bistrița watershed: the fortified settlement from Sărățica-*La Movilă* belonging to the first Iron Age sequence; remains of habitations belonging to the LBA and the necropolis used during the IInd-IVth centuries A.D. of Dochia-La perdele (Bolohan and Munteanu 2002); the Cucuteni A-B settlement from Mărgineni-*Iugani/Dealul lui Tanasă* (Bolohan and Crețu 2004b); the fortified settlement at Siliștea-*Pe Cetățuie*[1] dated to the Middle Bronze Age. For the sites mentioned, possible connections with activities of salt exploitation were not documented. At this point one can only suppose that settlements occupying dominant positions (Mărgineni-*Iugani/Dealul lui Tanasă* or Siliștea-*Pe Cetățuie*) manifested control (authority, power, visibility etc.) over the resources (Figure 3).

On several occasions, the investigation of salt springs[2] in a wider context was not made in isolation, but in conjunction with different parameters (landscape, materiality, structural analysis of the artifacts, ethnography, ways of communicating etc.). Contributions of the kind may refresh the way we illustrate the relationship between the agent, community, environment, and natural resources and the way we illustrate behavioral patterns.

Field survey and mapping

Between October 2014 - March 2017 we undertook investigations in the south-central part of the catchment area. The incentive was to fill in and update archaeological information where it was missing or was insufficient. As a result, we managed to identify two new sites belonging to Noua culture of the LBA (Români-*Cărbunești de Jos*, Români-*Râpa Roșie)* (Figure 4), a site dated to the Chalcolithic period at Hoisești-*La Curmătură/Plopiște* and to verify the location of an older site at Negrițești-*Movila Flocoasă* with traces of habitation from the Chalcolithic up to the very beginning of the Early Bronze Age (Figure 5).

The configuration of the site at Hoisești indicates a fortified settlement with a ditch and good visibility to the north (Bolohan and Drob 2022). This is a feature that almost all of the prehistoric settlements in the Cracău-Bistrița basin share. In contrast, the site from Negrițești-*Movila Flocoasă* situated towards the southern exit of the Verdele watershed shows a very good visibility towards the south, west and north (Bolohan and Drob 2022).

The Chalcolithic site at Hoisești-*La Curmătură/Plopiște* is impressive by its location, ditch, very good visibility and the material recovered. The salt spring from Hoisești-*Slatina Mică* lies 939 m to the south-southeast (Figure 6a).

The two contemporaneous LBA settlements exhibit dissimilarities in location and aspect. The site from Români-*Cărbunești de Jos* is situated on a landform between 298-302 m high with a slope between 3.5% to 7.8% (Figure 3). It benefits from solar exposure on the southwest and west. Five ash heaps are visible at ground level. The site is situated 2.07 km north of the salt spring at Negrițești-*Slatina Mare*. The source of fresh water is a few meters to the west. These preliminary remarks indicate that the site meets the topographic and material conditions characteristic of the LBA. The site at Români-*Râpa Roșie* occupies a plateau with an elevation between 329-334 m. The west and northwest extremity is separated by rugged terrain with slope angles of about 29%. The salt spring lies 590 m to the southwest. The site holds a dominant position

[1] Due to a technical error, the aforementioned site was erroneously recorded in terms of location and cultural sequence (Weller *et al.* 2007: 163). The fortification is situated 1.7 km N-NE towards the reference point *Slatina de Ochi* and it was dated to the beginnings of the Middle Bronze Age, East of the Carpathians (Bolohan and Crețu 2004a: 55; 60-61).

[2] There are already several contributions in favour of this model of interpretation, which, however, does not include the fortified settlement at Hoisești-*La Curmătură/Plopiște* or the one from the hilly area at Negrițești-*Movila Flocoasă*. We are of the opinion that the salt spring at Negrițești and the one at Hoisești-*Slătio(a)ra/Slatina Mică* need to be considered in connection with these settlements as they are much closer and have a generous visibility. The same is not available for the settlements at Traian-*Dealul Viei* and Traian-*Dealul Fântânilor* situated around 8.00 km west in the watershed of the Bistrița river (Brigand and Weller 2013: 203).

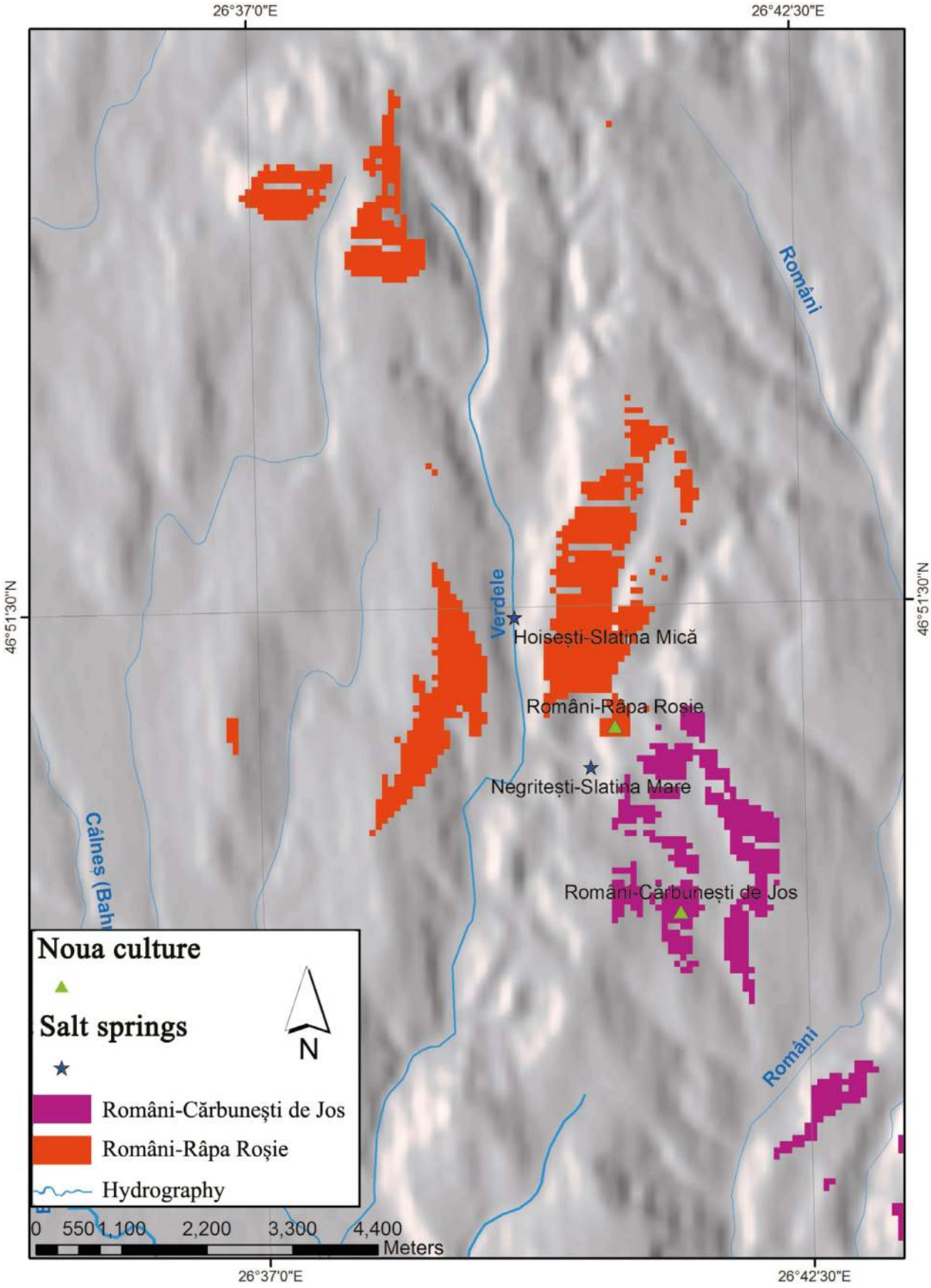

Figure 4. LBA discoveries in relation to the salt springs and the viewshed analysis.

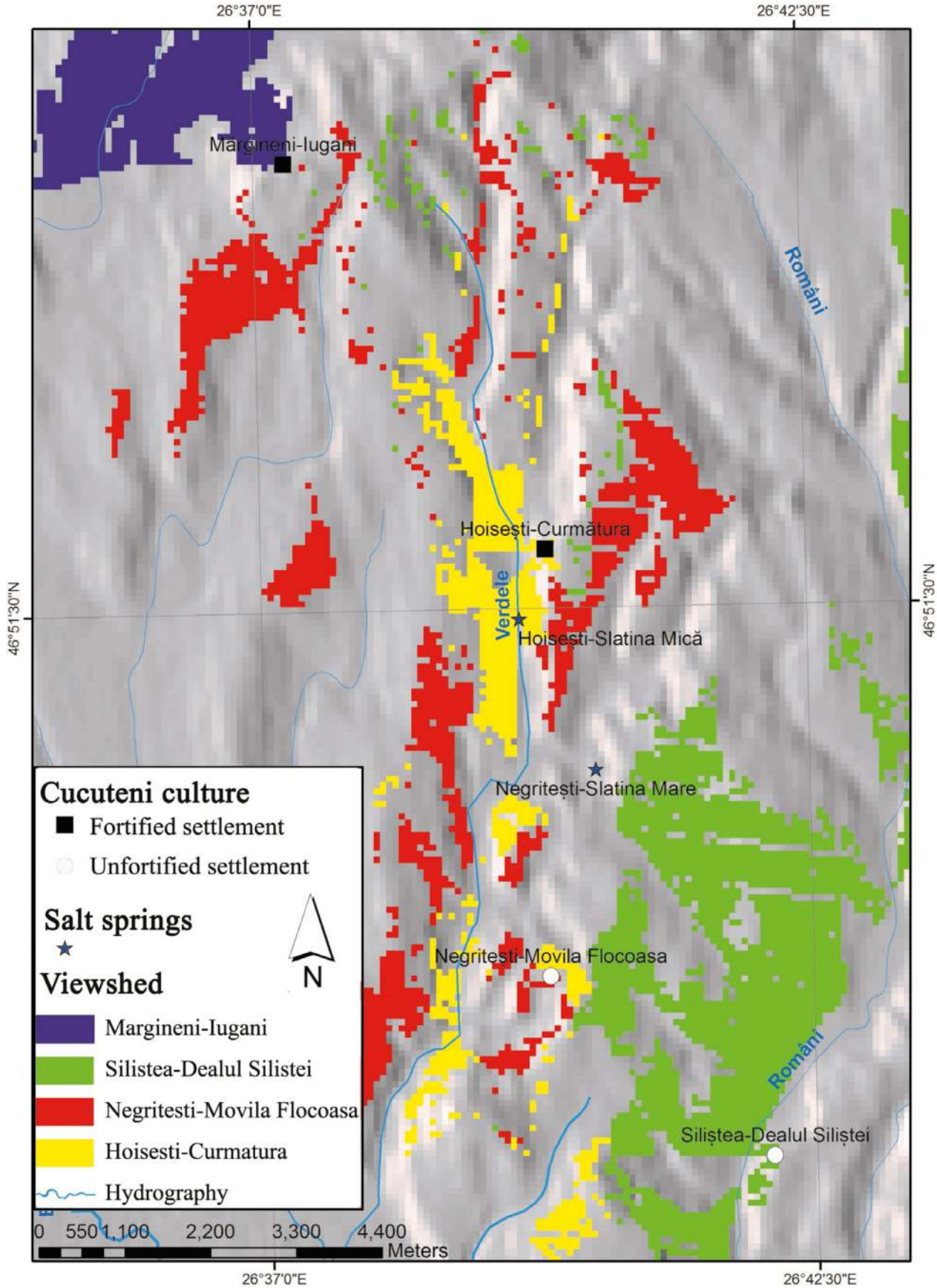

Figure 5. Chalcolithic discoveries in relation to the salt springs and the viewshed analysis.

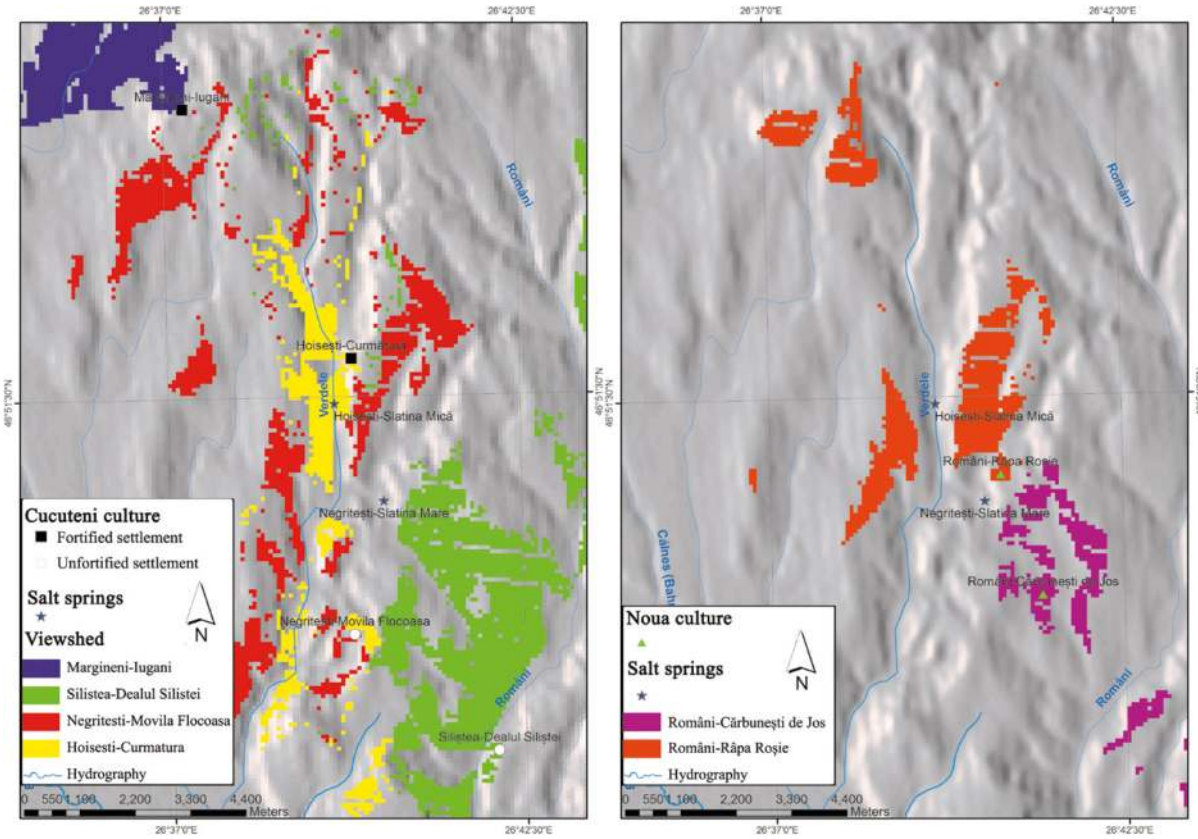

Figure 6. Chalcolithic (left) and LBA (right) discoveries. A diachronic view.

in respect to the surrounding relief and the first open settlement (Figure 6b).

In the area delimited we identified five new sites, with further investigations in progress. The archaeological and osteological material gathered shows signs of intense habitation in the proximity of the salt springs.

Archaeozoological analysis: Case study

Another constant of the LBA archaeological material is given by the animal remains. A total of 114 skeletal remains were collected for analysis from four ash heaps identified in the LBA site of Români-*Cărbunești de Jos*. Most of the bone fragments are in good condition, and the proportion of identified remains from the total sample is on average about 80% (Figure 8). In the case of ash heaps 1 and 2, the faunal remains were considered together, since they were found very close each to other. This sample contains 87 fragments, of which 41 are from cattle (*Bos taurus*), 5 each from horse (*Equus caballus*), pig (*Sus domesticus*) and sheep/goat (*Ovis aries/Capra hircus*), and 1 fragment of red deer (*Cervus elaphus*) antler, which was probably collected for processing (identified piece shows signs of working). In a similar way, the skeletal remains of ash heaps 3 and 4 (in a total of 11, respectively 16) are made up mainly of cattle (nine remains, respectively ten), followed by horse (one) or, respectively pig (five). The processed bones, most of them from cattle scapulas, have been identified in the common sample of the ash heaps 1 and 2 (Figure 7).

Considering as one total sample all faunal remains found in the four ash heaps (Figure 8), the archaeozoological data suggests long-range pasturing of cattle. This species predominates, comprising 73.17% of the identified remains. Other species identified in smaller proportions include: pig (12.20%), sheep/goat (6.10%), and horse (7.31%). There are no indications of hunting, with the exception of the one fragment of antler, which was, however, collected for working as above. Among the entire bone assemblage, there is to be noted the presence of processed bones, mostly from cattle (Figure 8).

The assemblage from the ash heaps identified at the Late Bronze Age site of Goșmani-*Cărbunești* does not look very different, in terms of species, from that of Dochia (Bejenaru and Stupu 2001), a nearby LBA settlement (Figure 8). Animal husbandry was a basic component for the local subsistence economy. Among domestic animals, cattle predominate as skeletal remains, followed by the group of pig, horse, and sheep/goat. Hunting is extremely poorly represented or not represented at all. Considering the high percentage

Figure 7. Processed animal bones identifed in the common sample of the Ash Pits 1+2: 1. cattle serrated scapula; 2. cattle astragalus; 3. horse radius; cattle cubitus.

of cattle, horse and sheep/goat, we can estimate that the communities of the LBA exploited the wide-open areas of Cracău-Bistrița watershed mainly for herding purposes. The site of Goșmani-*Cărbunești* stands out through a distinctive feature. The archaeozoological assemblage collected from the four ash heaps identified here exhibits a very high frequency of cattle skeletal remains, much more than in settlements of Late Bronze Age, such as of Dochia-*La Perdele* (Bejenaru and Stupu 2001) and others in the Eastern Carpathians (Haimovici 1997).

This archaeozoological pattern, identified in the ash heaps of Români-*Cărbunești de Jos*, could be an indicator of pastoral camps, near sources of water and salt – both required for animal flocks. Both conditions were met at Români-*Cărbunești de Jos*: water sources and the proximity of liquid salt sources from Negritesti-*Slatina Mare*. Salt is a mineral that is most always deficient in plants, and domestic herbivores, including cattle, should have access to salt at all times.

Attempts at spatial analysis

Spatial analysis requires a dynamic approach. Such an approach suits better the archaeological situation in the field. It is a reliable technique for managing and updating the archaeological data and the growing number of sites identified. This approach allows the possibility of extending the history of the sites situated in the vicinity of salt springs. In our example, the inclusion of the mentioned sites in the framework of spatial analysis, contributes positively to the analysis and existing models of interpretation. As other

Assemblage		**Goșmani-*Cărbunești***					Dochia (Bejenaru & Stupu, 2001)	
Taxon		Ash pit 1+2	Ash pit 3	Ash pit 4	Total			
Scientific name	Common name	NISP	NISP	NISP	NISP	%	NISP	%
Bos taurus	Cattle	41	9	10	60	73.17	156	56.52
Sus domesticus	Pig	5	-	5	10	12.20	36	13.04
Ovis aries/Capra hircus	Sheep/Goat	5	-	-	5	6.10	37	13.41
Equus caballus	Horse	5	1	-	6	7.31	39	14.13
Canis familiaris	Dog	-	-	-	-	-	4	1.45
*Cervus elaphus**	Red deer*	1*	-	-	1*	1.22*	-	-
Sus scrofa	Wild boar	-	-	-	-	-	3	1.09
Lepus europaeus	Hare	-	-	-	-	-	1	0.36
Total identified		57	10	15	82	100	276	100
Unidendified mammal		21	1	1	23		110	
Processed bones		9	-	-	9		3	
Total sample		87	11	16	**114**		**389**	

Figure 8. Quantification of faunal remains (NISP=number of identified specimens).

parameters add up (the source of fresh water, the salt springs and the surrounding vegetation), our approach proposes a review of the history of this unit as part of the wider prehistoric landscape. The analysis is structured on the observations recorded in the field (anthropic interventions, landslides, the source of water, roads, material traces, and distance to and from the settlement sites) and the results of field survey. With this project, the archaeological material recovered was processed and stored in the repository of the Faculty of History of the Alexandru Ioan Cuza University in Iași for research purposes. In the next stage we used a handheld GPS to map the locations and cross reference them against satellite imagery. This was necessary to better integrate the archaeological information into the history of the frequented landscape.

Conclusion

In this paper, we argue that interdisciplinary research carried out in the southern part of the Cracău-Bistrița watershed was beneficial. Together with archaeozoological analysis, on-site observations of geography, followed by data-processing, contribute to the diversification of the archaeological argument. In this context, the salt springs at Negrițești-*Slatina Mare* and Hoisești-*Slătio(a)ra/Slatina Mică*, Neamț County, could have acted as a hub for the local communities' activities. Clearly, these satisfied subsistence purposes. However, other components should not be overlooked.

The ways of access to the salt springs maintain and diversify the interaction between groups. The access to the salt source is regulated by the weather conditions, which influence the level of salinity in the area. Unhindered access to the source is dependent upon seasonal activities and the basic needs of the human groups. Having considered this, we set forth two examples of interaction with the salt springs. These pertain to different chronological sequences.

For the Chalcolithic, the proximity between the fortified settlement at Hoisești-*Plopiște/La Curmătură* (Pl. 6) and the salt spring at Hoisești-*Slătio(a)ra/Slatina Mică,* is evident as the salt spring is located 950 m to the south-southwest. The fortified settlement occupied by the Chalcolithic community was positioned in an advantageous location, with possibilities for immediate control over the salt source (Figure 7/ left). None of the other contemporaneous settlement sites in the area (Siliștea-*Dealul Siliștei*, Negrițești-*Movila Flocoasă*, Mărgineni-*Iugani/Dealul lui Tanasă*) were as privileged. The relationship between the Chalcolithic site at Hoisești-*La Curmătură/Plopiște* and the salt spring at Negrițești-*Slatina Mare*, situated 2.89 km to the south-southeast is not as clear. The artifacts recovered from the ground level of the site are substantial (grinders, fragments of adobe wall, pottery sherds etc). The effort put in to constructing the ditch around the site must have been considerable, thus, the site could not have lacked in importance (Figure 3.). Another contributing factor is the visual control over the immediate area, including over the two water sources. Having considered this, the modest pit from Hoisești-*Slătio(a)ra/Slatina Mică* would have been used ocasionally by the animal breeders of the neighbouring communities. On the contrary, the salty-source from Negrițești-*Slatina Mare* was frequented by communities situated at longer distances (ca. 8.7 km for the settlement at Mărgineni-*Iugani/Dealul lui Tanasă* and ca. 5.5 km north from the settlement at Siliștea-*Dealul Siliștei*; each site assigned to the Chalcolithic being located in a different watershed). This indicates a complex technological process that requires such activities as extraction, boiling, storage, transportation, fuel etc.

Activities of this kind necessitate setting up caravans and assigning control in order to ensure that the access to the salt source is properly administered.

For most of the Chalcolithic habitation under study, there was no direct visual contact with the main source of salt from Negrițești-*Slatina Mare* (Figure 5). Still, the almost dead salt source from Hoisești-*Slatina Mică* is in a direct visual relation with the stronghold from Hoisești-*La Curmătură/Plopiște* (Figure 6, left).

For the LBA the situation is different. The two settlement sites investigated, located at the western `frontier` of the Noua culture in Moldova, follow a different arrangement in relation to the salt springs. The novel sites at Români-*Cărbunești de Jos* and Români-*Râpa Roșie* are situated at different lengths in relation to the shaft at Negrițești-*Slatina Mare* and the source at Hoisești-*Slătio(a)ra/Slatina Mică* (Figure 6/right). The source of salt would have been indispensable in order to satisfy basic activities. Cattle herding and hide-working require a constant source of salt. Cattle herding would have involved periodic migration towards the two salt springs. Salt would have also been vital in the first stage of hide-working. This would motivate the process of salt extraction and evaporation to obtain the final product, followed by its transportation to the site. Here, it would serve the technological process and the community's dietary needs, as indicated by the quantities of archaeozoological remains.

Given the increased mobility of these livestock herders, the salt water could have been transported in skin carry-sacks, by their own animals. This is yet another possible interpretation. The proximity to the salt sources facilitated the activities in which the communities of the LBA were engaged. It is possible to find them in the southern extremity of the basin as well, a result of the seasonal migration of the cattle herders on the north-

south axis, between the Câlneș river and the upper basin of the Români river.

The new data indicate that the exploitation of the salt springs was not uniform. As a result, we suggest two distinct ways of salt exploitation that contributed to a vertical and horizontal pattern of interaction. A development on the vertical implies control and hierarchization; settlements are fortified and visual control is practiced over a salt source or over the transportation routes (see Hoisești-*Slătio(a)ra/Slatina Mică* and Negrițești-*Movila Flocoasă*). Salt is transported on longer distances, and the settlements are inhabited for longer periods (Weller *et al.* 2011, 77). This model is proposed to better understand the networking of salt for the Chalcolithic sequence.

The data suggest that in the Late Bronze Age the communities follow a horizontal model of interaction, motivated by the proximity of the salt source. The human cost to reach the salt spring falls in the range of one hour walking distance (see the distance between Români-*Cărbunești de Jos* and Negrițești-*Slatina Mare*).

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References

Alexianu, M., Weller, O. and Brigand, R. 2007. *Izvoarele de apă sărată din Moldova subcarpatică. Cercetări etnoarheologice*. Iaşi, Casa Editorială Demiurg.

Alexianu, M., Weller, O., Brigand, R., Cotiugă, V., Curcă, R.-G. and Moga, I. 2011. Salt Springs in today's Rural World. An Ethnoarchaeological Approach in Moldavia (Romania). In M. Alexianu, O. Weller and R.-G. Curcă, (eds.), *Archaeology and anthropology of salt: A Diachronic Approach*: 7-23: Oxford Archaeopress, 'British Archaeological Reports', International Series 2198.

Alexianu, M., Weller, O., Brigand, R. and Curcă, R-G. 2014. Annäherungen an eine Unsichtbare Vergangenheit: Ethnoarchäologische Forschungen zu den Salzwasserquellen der Moldauischen Vorkarpaten (Rumänien). *Studia Antiqua et Archaeologica* XX: 7-37.

Bejenaru, L. and Stupu, M. 2001. *Aspecte arheozoologice privind comportamentul ocupaţional al populaţiei de cultură Noua, din zona Depresiunii Cracău-Bistriţa. Natura şi Omul*: 103-109. Muzeul Judeţean de *Ştiinţele* Naturii Prahova.

Bolohan N. and Munteanu E. R. 2002. Necropola carpică de la Dochia „La Perdele`, comuna Girov, jud. Neamț, *Memoria Antiquitatis XXII*: 291-307.

Bolohan N. and Crețu C. 2004a. Recent discoveries belonging to Early/Middle Bronze Age in central Moldova. In I. Niculiță, A. Zanoci and M. Băț (eds.), *Thracians and Circumpontic World, proceedings of the Ninth International Congress of Thracology*, Chişinău-Vadul lui Vodă, 6-11 September 2004: 55-77. Chișinău, Cartdidact.

Bolohan N. and Crețu C. 2004b. Materiale arheologice din aşezarea Cucuteni A-B ***şi*** B de la Mărgineni, jud. Neamţ. *Memoria Antiquitatis* XXIII: 203-221.

Bolohan, N. and Drob, A. 2022. Hoisesti – La Curmătură 1, Neamt county. An archaeological survey in Eastern Romania. Cercetări Arheologice. Revistă a Muzeului Național de Istorie a României, 29/2, 411-454.

Brigand, R. and Weller, O. 2013. Neolithic and Chalcolithic settlement patterns in central Moldavia (Romania). *Documenta Praehistorica* XL: 195-207.

Dumitroaia, Gh. 1992. Săpături *şi* cercetări arheologice de suprafaţă *în* judeţul Neamţ (1987-1991*). Memoria Antiquitatis* XVIII: 287-297.

Dumitroaia, Gh. 1994. Săpături şi cercetări arheologice de suprafaţă în judeţul Neamţ (1992-1993). *Memoria Antiquitatis* XIX: 509-521.

Dumitroaia, Gh. 2004. Săpături arheologice sistematice *şi* periegheze din judeţele Neamţ, Bacău *şi* Suceava (2002-2003). *Memoria Antiquitatis* XXIII: 431-449.

Haimovici, S. 1997. L'économie animalière de la culture Noua (Bronze final, Roumanie orientale): Les données arhéozoologiques. 7, International Kongress I.C.A.Z. Konstanz 1994. *Anthropozoologica* 25-26: 691-697.

Lupaşcu, Gh. 1996. *Depresiunea Cracău – Bistriţa. Studiu pedogeografic*. Iaşi, Editura Corson.

Monah, D. 1991. L'exploitation du sel dans les Carpates orientales et ses rapports avec la culture de Cucuteni-Tripolye. In V. Chirica and D. Monah (eds.), *Le Paléolithique et le Néolithique de la Roumanie en contexte européen*: 387-400. Iași, Bibliotheca Archaeologica Iassiensis IV.

Monah, D. 2002. L'exploitation préhistorique du sel dans les Carpates orientales. In O. Weller (ed.), *Archéologie du sel. Techniques et sociétés dans la Pré et Protohistoire européenne. Actes du colloque international, XIVe Congrès UISPP, Liège (Belgique), 2001*: 135-146. Rahden Westfalen.

Weller, O., Brigand, R. and Alexianu M. 2007. Cercetări sistematice asupra izvoarelor de apă sărată din Moldova. Bilanţul explorărilor din anii 2004-2007 efectuate în special în judeţul Neamţ. *Memoria Antiquitatis* XXIV: 121-190.

Weller, O., Brigand, R. and Nuninger, L. 2008a. Spatial analysis of the Salt Spring exploitation in Moldavian Pre-Carpatic Prehistory (Romania). In Archaedyn 7 millennia of territorial dynamics Settlement pattern, production and trades from Neolithic to Middle Ages, Jun 2008: 225-233. Dijon. https://halshs.archives-ouvertes.fr/halshs-00416026/document

Weller, O., Brigand, R., Nuninger, L., Dumitroaia, Gh. and Monah, D. 2008b. Analyses et dynamiques spatiales autour des sources salées de Moldavie sous-carpatique durant la Préhistoire roumaine (6000-3500 BC). In N. Morère Molinero (ed.), *Las salinas y la sal de interior en la historia: economía, medioambiente y Sociedad: 165-185.* Sigüenza, Espagne. Universidad Rey Juan Carlos-Dykinson.

Weller O., Brigand R., Nuninger L. and Dumitroaia Gh. 2011. Spatial analysis of prehistoric salt exploitation in Eastern Carpathians (Romania). In M. Alexianu, O. Weller, R. Curcă (eds.), *Archaeology and Anthropology of salt. A diachronic approach, Proceedings of the International Colloquium (1-5 oct.2008), Iași*: 69-80. British Archaeological Reports International Series 2198. Oxford, Archaeopress.Weller O., Brigand R., Nuninger L. and Dumitroaia Gh. 2011. Spatial analysis of prehistoric salt exploitation in Eastern Carpathians (Romania). In M. Alexianu, O. Weller, R. Curcă (eds.), *Archaeology and Anthropology of salt. A diachronic approach, Proceedings of the International Colloquium (1-5 oct.2008), Iași*: 69-80. British Archaeological Reports International Series 2198. Oxford, Archaeopress.

A Technological Approach to the Production Sequence at the Beaker Brine-Boiling Site of Molino Sanchón II (Villafáfila, Zamora, Spain): Some Hypotheses about the Moulding of Salt using Organic Containers

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Abstract

The Beaker site of Molino Sanchón II, located at the saline Lagoons of Villafáfila (Zamora, Spain), represents a salt-processing centre which used the brine-boiling method. Theoretically, the procedure might have involved the following stages: 1) Brine was poured into large ceramic vessels placed over fires; 2) the resulting salt paste was transferred to smaller ceramic moulds set on pedestals that stood over a hearth of glowing embers; 3) finally those moulds were broken open in order to obtain hard and transportable salt cakes. However, a detailed analysis of the ceramic assemblage has shown that small containers representative of stage 3 are very much the exception at Molino Sanchón II. Alternative procedures are discussed in this paper. The function of Beaker pottery at this site, one of the most abundant collections known in Iberia, is also assessed here.

Keywords: Brine-boiling, Iberia, Beakers, moulding, organic materials.

Introduction

Prior to the environmental policy witnessed in Spain during the 19th century, which favored the desiccation of many wetlands, small endorheic lakes were common in the sedimentary soils of the Spanish Northern Plateau, a region through which the Duero River flows. Among them, the Lagunas de Villafáfila, in the north-eastern part of the province of Zamora, miraculously managed to elude desiccation. Another feature that distinguishes this lake complex is the salinity of its water, a factor that triggered the economic development of the region, known as Lampreana, during the Middle Ages, as a result of the exploitation of salt. According to some medieval chronicles, the earliest *capuanas* or *pausatas* (both terms referring to salt-processing factories) date back to the beginning of the 10th century. During the 12th and 13th centuries this activity, which was the responsibility of the aristocracy, the Church or even the monarchy, reached its peak, and from then onwards it progressively began to decline.

The process came to an end by the 15th century, when the progress of the Reconquista southwards gave access to some salt-works on the Atlantic coast, such as Setúbal or the Guadalquivir River mouth, which had been hitherto under Muslim control and then fell into the hands of the Christian kingdom of Castile (Rodríguez Rodríguez 2000).

The reason for the success of Villafáfila primarily lies in its strategic location, as there are no other major potential sources of salt within a 200km-radius area. In view of the fact that this situation was the same in prehistoric times, we set up an archaeological research project at this lake complex, comprised of field-walking surveys and excavation, in order to track the origins of salt exploitation (Delibes *et al.* 2007a). Extensive field-walking surveys registered 55 sites corresponding to the Chalcolithic, Bronze Age and Early Iron Age, which tend to concentrate on the lakeshores themselves (Abarquero *et al.* 2010a). The excavation of two of these sites, Molino Sanchón II and Santioste, dating back to the end of the Copper Age (ca. 2400-2000 cal BC) and the Early Bronze Age (ca. 2100-1500 cal BC) respectively, demonstrated that they were salt-processing centres employing the method of brine boiling (Abarquero *et al.* 2017) (Figure 1).

The results of our project have been published elsewhere, and they have focused on different issues, such as the procedures for the processing of brine, the socioeconomic implications of salt exploitation, and the evidence of ritual activity, something that might be associated with propitiatory ceremonies (Abarquero *et al.* 2010b, 2012; Delibes *et al.* 2016; Guerra *et al.* 2011, 2012, 2015). On this occasion, we shall pay attention to certain particularities of the production sequence, which will reveal some slight differences in the *modus operandi* of the Villafáfila brine-boiling sites in comparison to others in Prehistoric Europe.

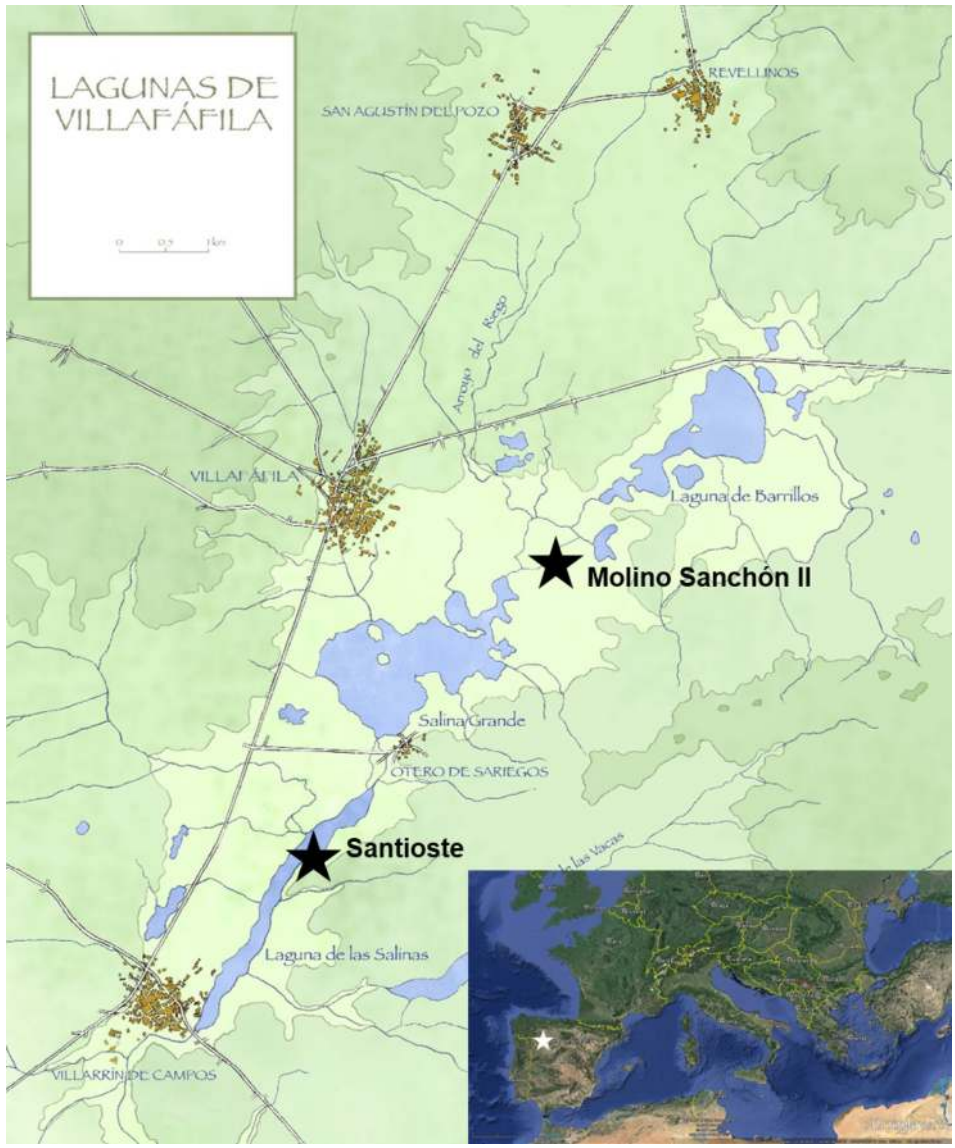

Figure 1. Map showing the location of the Villafáfila Lagoons and the two excavated sites there: the Beaker site of Molino Sanchón II and the Early Bronze Age site of Santioste.

The processing of brine at the Villafáfila prehistoric sites

The sites of Molino Sanchón II and Santioste have both provided archeological evidence for the exploitation of salt through brine boiling, that is, the transformation of salt water into solid salt by means of a forced evaporation process using fire and clay containers. This evidence consisted of pit-wells dug down to the groundwater table, boiling areas and accumulations of discarded pottery once the production sequence was completed. All these factors seem to suggest similar production processes at both sites, while firing structures evolved over time.

As a result of the endorheic origin of the lakes, salt exploitation at Villafáfila, both in Prehistory and in the Middle Ages, was a seasonal activity that was carried out exclusively in summertime, since the salinity of the water during the rest of the year was too low for brine processing to be profitable. Moreover, most of the salt-processing sites are either completely or partially flooded in winter and springtime. Therefore, the occupation of the sites was only possible in the hottest months of the year, when the sheet of water evaporated. Consequently, salt producers at Villafáfila were forced to process brine at that time of the year –with the advantage of a higher salinity– by digging simple pit-wells down to the groundwater table, such as those found in Molino Sanchón II and Santioste, of approximately 2m in depth.

The next step would have involved the lixiviation in decanting basins of the salty soil extracted from the

pit-wells, similar to the dirty crusts that occurred on the ground when the lakes dried out. These kinds of features have been found at the end of the occupation of Molino Sanchón II and throughout the sequence at Santioste. Located close to the pit-wells, they adopt the form of whitish clay-lined pits, with a concavity in the bottom, and usually filled with very fine silts.

Subsequently, brine boiling would have made salt precipitate, as there is no evidence, at least at Villafáfila, of employing the technique of insolation during prehistoric times; hence, the presence in production areas of ashes, charcoal and lumps of red clay directly related to the boiling activities. At Molino Sanchón II these spaces adopt the form of circle hearths acting as trivets, as they accommodate some pedestals made of clay or stone and often grouped in threes, the function of which was to support over fires the large vessels containing the salt paste. The procedure was quite similar at Santioste, at least during the early stages of the occupation, because later on more complex firing structures prevailed there. These are rectangular clay-walled kilns, possibly provided with a grid on top and openings in the shorter sides through which holm oak wood was inserted. Large pottery vessels used to boil brine have been found in some of them.

As a result of the salt-processing activities, accumulations of thousands of pottery sherds that correspond to discarded vessels previously employed to boil brine have been found at the two excavated sites. Surprisingly, at Molino Sanchón II many Beaker pots can be distinguished among these massive concentrations. In fact, the number of fragments is so abundant that at Santioste these accumulations were first interpreted as pottery wasters (Viñé *et al.* 1990, 1991).

The ceramic collection of Molino Sanchón II: typological and volumetric analysis

The results of the fabric analysis carried out on a selected number of pieces from the prehistoric ceramic collection of Molino Sanchón II indicate that they were produced with local clays and were fired at temperatures over 500º-600º, the great majority of them undergoing a complete firing cycle (Odriozola and Martínez-Blanes 2012: 463). The ceramic assemblage is highly fragmented and, as a result, this has made it difficult to reconstruct the complete profiles of most of the vessels and then to analyse them typologically and volumetrically. In any case, both plain and decorated types are pots of large capacity, although smaller vessels are occasionally present.

Ceramic sherds at the site are very abundant, since the two excavation campaigns, carried out over an area of 72m2, have yielded around 52,500 fragments. However, only a representative selection has been chosen for detailed study, comprising more than 8000 sherds that include different forms and decorations.

We shall start with briquetage. Sometimes this term is very broad and refers to massive deposits of coarse ceramic material used to boil brine or sea water, which comprises ceramic vessels and clay pedestals. However, more strictly speaking, it should only be applied to unfired pots or those partially fired during the process of boiling brine. In Molino Sanchón II containers of this type are extremely scarce, representing less than 1% of the selected assemblage. Their pastes are always reddish or brownish and frequently include organic temper, as suggested by the imprints of reeds and small vegetable fragments that have now disappeared. Some of these pots also show basketry impressions on the exterior surfaces, possibly resulting from the use of baskets as moulds to sustain the pots while not yet firm. The usual shapes are bowls and flat-bottomed conical pots with large rim diameters. As these types of pots are quite exceptional at Molino Sanchón II, it seems that they were not frequently used throughout the process; brine was most likely to have been processed in authentic pottery vessels.

The pottery collection at Molino Sanchón II is dominated by plain types of varying shapes, which represent almost 97% of all the ceramic finds, but ornamented pots have also been recovered. These include non-Beaker and Beaker sherds (less than 1% and 2%, respectively). Fabric analyses suggest that plain types were directly used in the processing of brine. Based on the premise that high levels of chloride are a marker for salt-making pottery (Horiuchi *et al.* 2011), samples from Molino Sanchón II corresponding to plain containers show higher levels of Cl in comparison with samples of the other types in the site (Odriozola and Martínez-Blanes 2012: 461-463). Certainly the same procedure has proved the use of the Champ-Durand type vessels found in Late Neolithic sites of France in brine-processing activities (Ard and Weller 2012).

Typologically plain pottery is mainly dominated by large vessels (Figure 2: 1), which are globular or carinated with everted rims. Their diameters at the mouth range between 30 and 45cm. Their capacity has been estimated at between 16 and 40 liters. Another type is represented by large globular pots with short vertical necks (Figure 2: 2). In this case their diameters at the mouth range from about 18 to 49cm, but their mean volume could not be estimated as containers of this type are highly fragmented. Plain bowls with wide mouth openings are quite frequent (Figure 2: 3a). These can be divided into ones with diameters between 11 and 27cm, and bigger containers of between 32 and 40cm diameters.

Less common plain types include large spherical vessels, which derive from the local Chalcolithic tradition, and have been recovered at the bottom layers (Figure 2: 4). Their diameters fluctuate between 18 and 32cm. On the other hand, at the upper layers large carinated vessels and pots with an S-profile have replaced them. The maximum volume of the latter types has been estimated at 15 and 10 liters, respectively (Figure 2: 5,6). Smaller plain vessels are quite exceptional. Their high quality and reduced capacity (less than 1 liter) seem to indicate that these pieces were not directly related to brine processing (Figure 2: 3b).

Decorated pottery at Molino Sanchón II can be divided into non-Beaker and Beaker sherds. Pots corresponding to the first category include fingernail, incised and impressed designs with quite simple patterns, and applied cordons and plastic decorations, such as small horizontal handles or ribs in relief. Painted decoration is extremely rare at the site.

Beaker pottery is quite abundant, since more than a thousand fragments have been found: a hundred of them were recovered from disturbed contexts, as they occurred in the filling soil of some medieval tombs, or were picked up on the ploughed surface of the site. However, the remaining 924 Beaker sherds are associated with the prehistoric salt-processing centre. Several different types have been distinguished:

- Large carinated vessels with everted rims (Figure 3: 1a-b). They are very fragmented but some present flat bottoms. Diameter at the mouth: 30-52cm; capacity: 15-30 liters.
- Bowls (Figure 4: 2a) Diameter at the mouth: 15-22cm; capacity: less than 1 to 3 liters. Outside these ranges a huge bowl has a diameter at the mouth of 36.5 cm and a volume of 6.7 liters (Figure 4: 2b).
- Bell Beakers. This category comprises medium vessels, whose diameters range from 13 to 27cm,

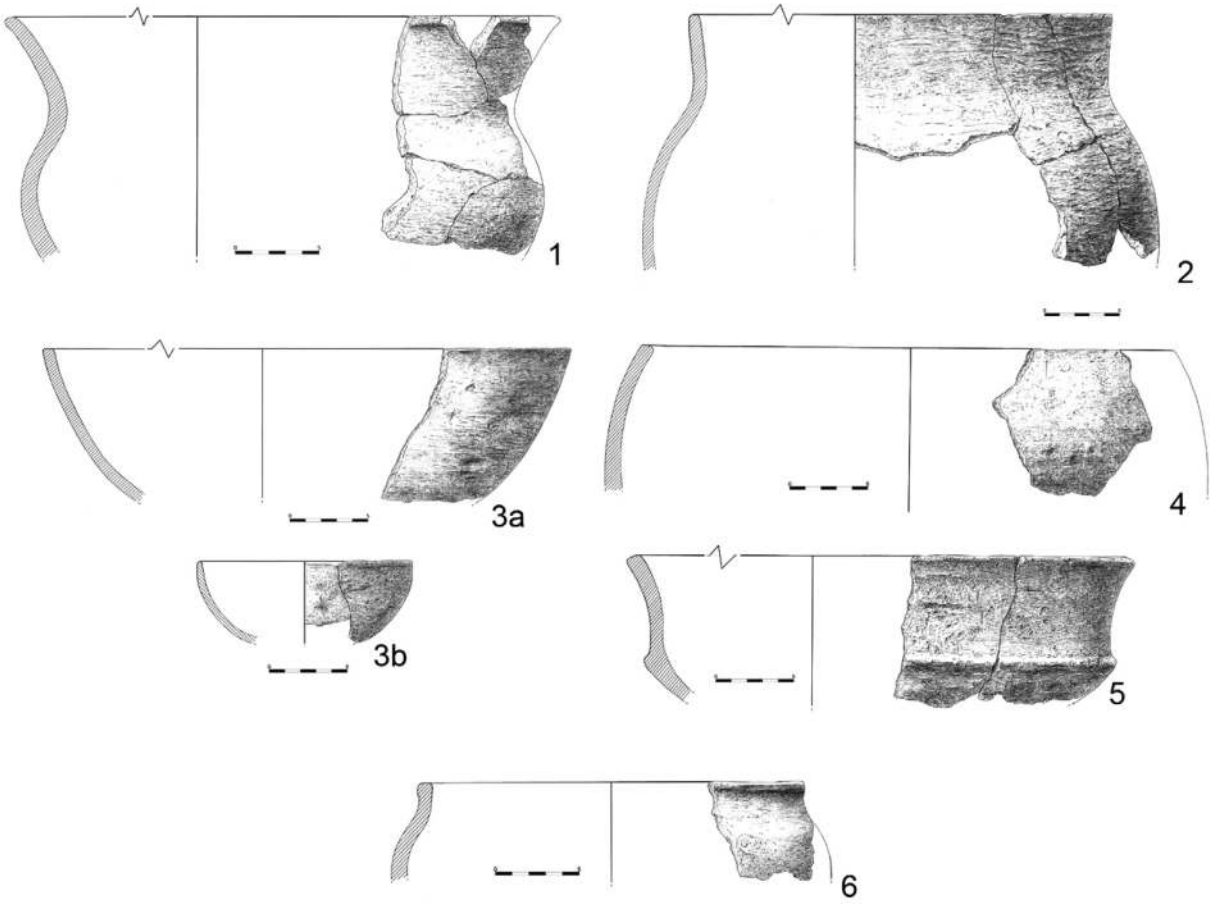

Figure 2. Plain pottery types from Molino Sanchón II (drawing by Ángel Rodríguez González).

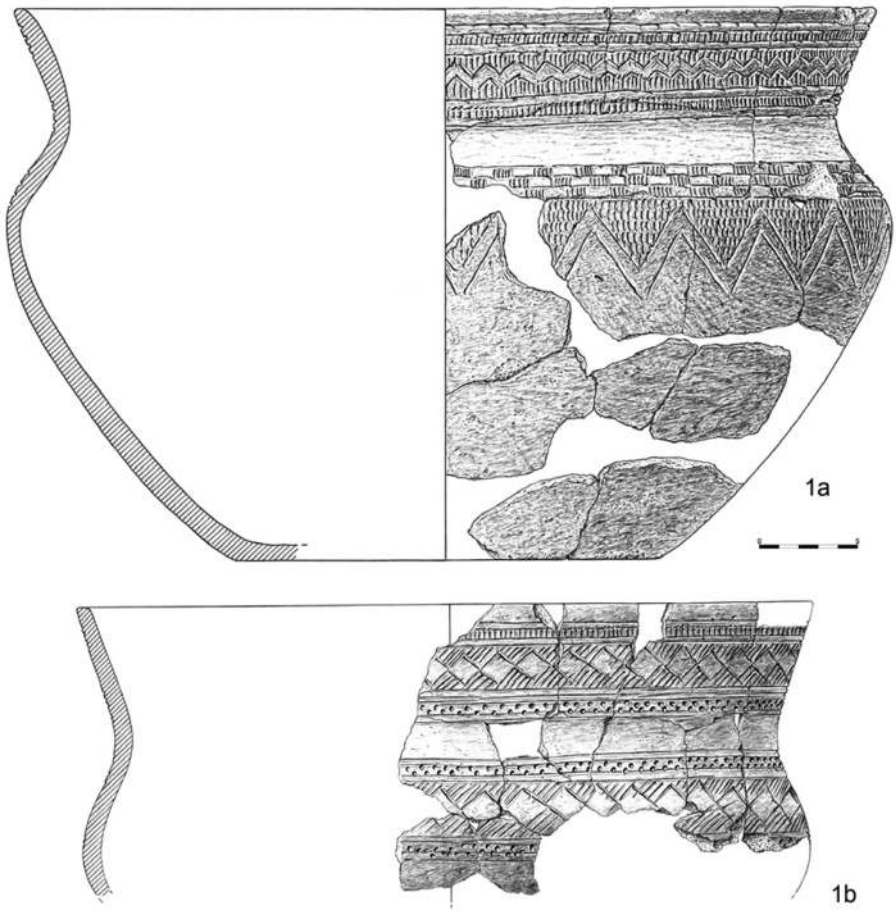

Figure 3. Beaker pottery types from Molino Sanchón II (drawing by Ángel Rodríguez González).

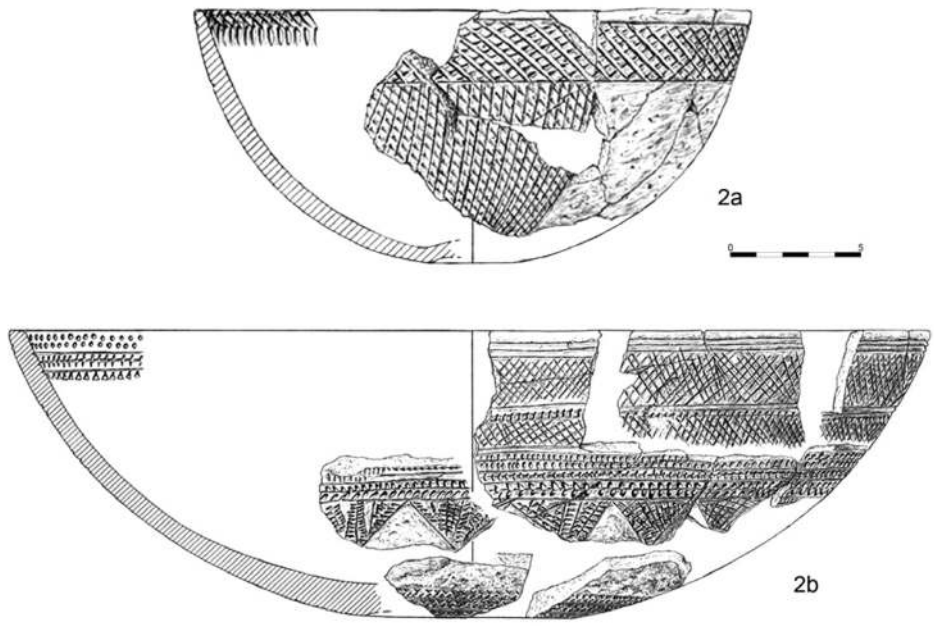

Figure 4. Beaker pottery types from Molino Sanchón II (drawing by Ángel Rodríguez González).

and whose capacity varies between 4 and 9 liters (Figure 5: 3a), but there are also larger ones, whose diameters range from 40 to 50cm, and whose capacity has been estimated at 40 liters (Figure 5: 3b).

- Carinated bowls are suggested by the occurrence of a number of everted rims and carinated sherds (Figure 5: 4a-b). Most of them correspond to large vessels, whose diameters are over 30cm, and their capacity can reach 9 liters.
- An exceptional piece is a large globular vessel (Figure 5: 5), with a diameter at the mouth of 32cm. This shape is paralleled in Chalcolithic Pre-Beaker pottery from Iberia (the so-called *globos de lámpara*), and even in some plain vessels collected at Molino Sanchón II, but not in Beaker pottery.

An overall picture of the pottery collection of Molino Sanchón II shows some differences between phases I and II. The early phase, developing between 2400-2100 cal BC according to the radiocarbon results, is dominated by large plain vessels and bowls, fired at reduced atmosphere. Non-Beaker decorated sherds include applied plain cordons and small ribs in relief. This assemblage is very much similar to that from contemporary sites in the Spanish Northern Plateau, for instance those in the Ribera del Duero area (Rodríguez Marcos 2008: 263-274). Beaker pottery is quite abundant in Molino Sanchón II, as it represents approximately 16% of the selected assemblage. Apart from one small sherd decorated with a series of comb-impressed lines, which might correspond to the MLV variety, the rest of the Beaker sherds correspond to the Ciempozuelos style.

Phase II, which developed slightly later (c. 2200-2000 cal BC) is characterized by oxidized pottery and simpler surface treatments. More frequent shapes correspond to S-profiles and carinated pots. Beaker sherds make up less than 4% of the selected assemblage, and new motifs, such as impressions and incisions on both plastic cordons and rims, are present among the non-Beaker decorated pottery. Pottery recovered from Phase

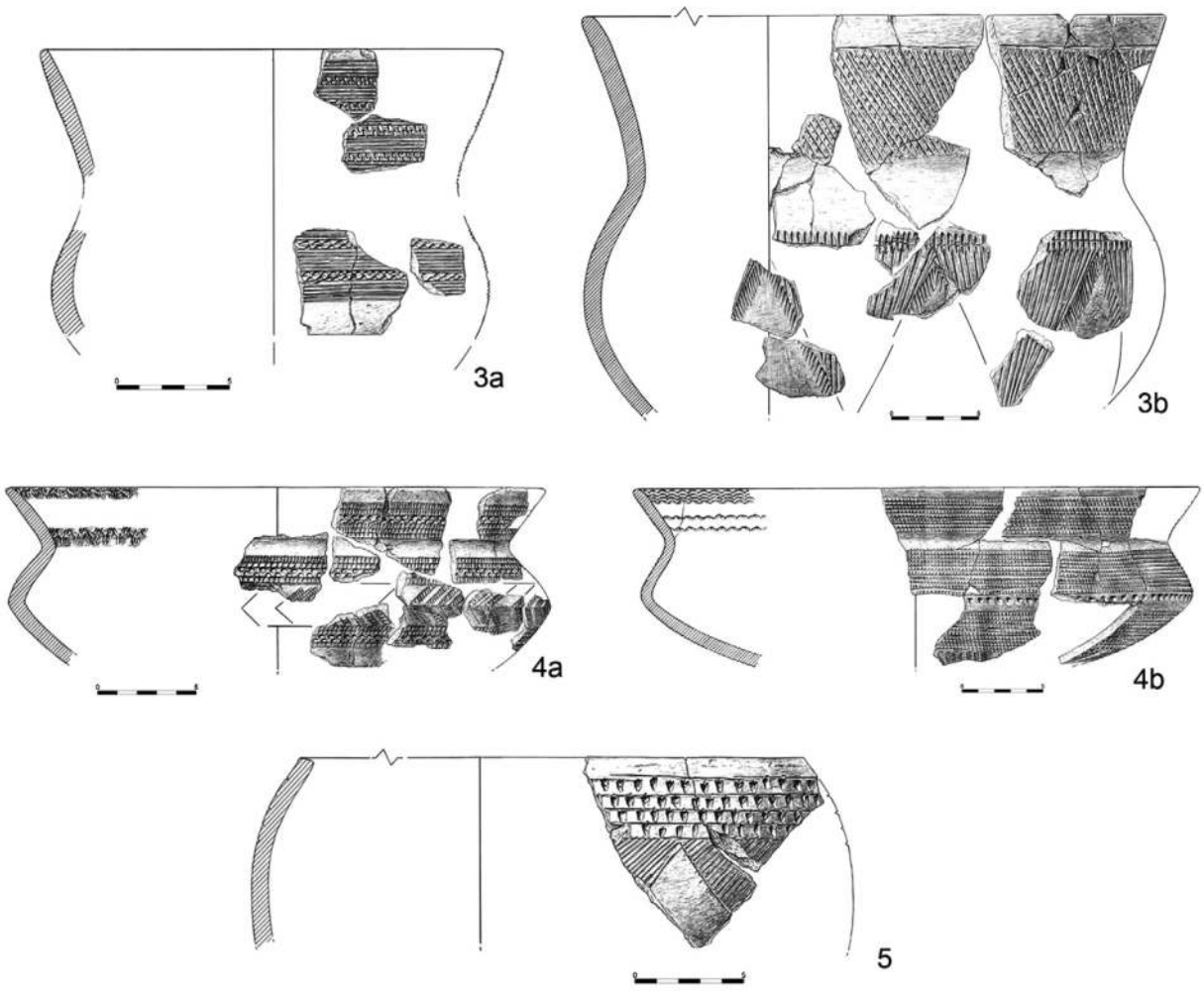

Figure 5. Beaker pottery types from Molino Sanchón II (drawing by Ángel Rodríguez González).

II is representative of the regional Early Bronze Age tradition, which has been referred to as the Parpantique horizon, after a site in the eastern area of the Iberian Northern plateau (Jimeno 1988). At the nearby Early Bronze Age site of Santioste, the ceramic collection is very much similar to that from Molino Sanchón phase II (Delibes *et al*. 1998; Abarquero *et al*. 2012).

Use of moulds made of organic materials?

Taking as a reference point the technical steps involved in the method of brine boiling, which have been archaeologically documented throughout Prehistoric Europe (Alexianu *et al.* 2011; Brigand and Weller 2015; Fíguls and Weller 2007; Harding 2013; Nikolov and Bacvarov 2012; Weller 2002) and also experimentally tested (Bodi 2007; Hees 2002; Tencariu *et al*. 2015), the production sequence that we had initially envisaged from a theoretical perspective for the procurement of salt at Molino Sanchón II implied the following stages: 1) Natural brine obtained from the lagoons themselves or from pit-wells would have been poured into large ceramic vessels placed over fires in order to facilitate the concentration of the brine; 2) the resulting salt paste would then have been transferred to smaller ceramic moulds set on clay or stone pedestals that stand over hearths of glowing embers; and 3) finally those moulds would have been broken open in order to obtain hard and transportable salt cakes.

However, in view of the results obtained from the typological and volumetrical analysis of the ceramic collection of Molino Sanchón II, it seems clear that real briquetage was not widely used to process salt. Instead, authentic pottery containers and, more precisely, large plain vessels seem to have accomplished the transformation of brine into salt paste. Ethnographical studies carried out in traditional salt-works in Mexico show that prolonged exposure of large pots on the fire causes a short service life (Ceja 2011: 42). This would explain the abundant number of discarded sherds corresponding to pots of considerable capacity found at Molino Sanchón II.

Theoretically, the salt paste would have then been transferred to smaller ceramic containers, since the crystallization process frequently takes place in vessels of low capacity acting as moulds. Not only are moulds used to produce hard and transportable salt cakes, but also ´*The use of ceramic moulds of practically identical shapes and volumes by each cultural group attests to the commitment to produce and package the salt according to a predefined shape, compact and easy to transport. The production is not aimed at simply producing salt, but salt cakes of a standardised quality, size and weight. The salt cake thus becomes a social object, an identity marker of the producers. In this form, it will circulate conveniently, be divided without losing its use value, and be stored for many years*` (Weller 2015: 72). However, the fact that small pots are very much the exception at the site makes it necessary to contemplate other options when considering how crystallized salt was obtained at Molino Sanchón II (Guerra *et al*. 2017).

The possibility of employing large vessels seems unlikely, as it would have taken a long time and consumed a great amount of fuelwood. In this regard it is worth noting the traditional use of organic containers in salt-processing activities worldwide. For instance, ethnographical and historical accounts often report the use of baskets in coastal salterns to harvest the final product, as they help the salt to dry out completely. In New Guinea the Western Dani people obtain salt from the burning of plants soaked in brine, subsequently selecting the salt from the ash and compressing it into packets wrapped in plant material that are also used for circulating the product (Pétrequin *et al.* 2001). But the presence of baskets in salt-works involved in boiling brine with the help of briquetage has also been attested archaeologically, thanks to the discovery of some ceramic sherds displaying plant imprints and traces of wickerwork on the bottom (Castellón 2007: 453; Liot 2002: 91; Weller 2015: 72), like those recovered at Molino Sanchón II and Santioste (Abarquero *et al.* 2012) (Figure 6). Similar sherds, some of which suggest the use of esparto grass baskets in their manufacture, have been found at Espartinas, another Beaker salt-processing site, close to Madrid (Valiente *et al*. 2003).

Ethno-archaeological research projects carried out in the Sub-Carpathian area of Eastern Romania show that it is possible to obtain salt in certain forms in the absence of ceramic moulds (Alexianu *et al.* 2007a). In order to do so, the salt paste is poured onto a piece of cloth that is then tied up by using a string and exposed to wind and sun (Alexianu *et al.* 2007b: 424; Munteanu *et al.* 2007: 69). The salt paste resulting from brine boiling at salt-works in Dallol Fogha (Nigeria) is processed in this way, and the final product consists of mat packets ready to be traded (Gouletquer and Weller 2015). In view of the existence of a number of sherds displaying basketry impressions, both at Molino Sanchón II and Santioste, we think that in addition to serving as moulds to manufacture actual pots –as has been suggested for some sherds recovered at Provadia-Solnitsata that demonstrate the coil technique (Weller 2012: 74) or more recently, as perishable containers to transport the salt cakes (Andonova and Nikolov 2021) -and especially considering the need of great numbers of vessels at brine-boiling sites, smaller woven baskets and textile sacks may have served to complete the crystallization process and thus obtain standardized sachets intended for salt trade. These packets may have been strung up in wooden structures acting as racks, hence the presence of a number of pit-holes in the excavated area, the location of which, close to firing structures, is occasionally indicative of wind-breaks, although on other occasions they are not

Figure. 6. Some sherds showing basketry impressions, found in Molino Sanchón II (photo: the authors).

associated with fire (Figure. 7). Over a century ago, Louis Siret (1913) suggested that actual baskets may have been the inspiration for the manufacture of the Maritime Bell Beakers (the International style). Might Maritime Beakers have imitated organic sachets in which salt was distributed in Western Europe during the third millennium BC (Guerra 2016; see also Guerra this volume)?

The role of Beaker pottery at Molino Sanchón II: ritual activity at salt-works

Another interesting issue regarding the ceramic assemblage recovered at Molino Sanchón II is the significant amount of Beaker pottery found there, considering that this distinctive ceramic ware may have had a ritual character (Guerra *et al.* 2011). At least in Iberia it seems that Beaker groups may have controlled the exploitation and distribution of salt (Guerra et al. 2019), as suggested by the presence of Beaker pottery (Ciempozuelos style) in the vicinity of saline resources (Delibes *et al.* 2007b; Delibes and del Val 2007-2008).

The presence of fine wares has also been reported at other salt-making archaeological sites, for instance, those of the Postclassic period in Central Mexico (Castellón 2007: 457). It is unlikely that the function of pots of this kind at salt-processing sites is directly related to the exploitation of salt, and this has been confirmed in Molino Sanchón II by the results of the fabric analyses commented on above, as the levels of chloride in Beaker sherds are much lower than those detected on plain pottery samples (Odriozola and Martínez-Blanes 2012: 461-463).

Ethnographical and historical accounts, as well as archaeological data, demonstrate that mining and metallurgical activities amongst preindustrial societies have symbolic and magical connotations, hence the necessity to perform ritual ceremonies there (Blas 2010; Budd and Taylor 1995; Eliade 1978). Therefore, the discovery of Beaker pots in metalworking areas, some of them even including copper slags adhering to their inner walls (Guerra 2006) should be understood in relation to these practices. There is evidence of the celebration of similar ceremonies at salt-works worldwide. Traditional salt-makers in Veracruz, Mexico, bless the cross, which has been placed next to the salt spring, at the beginning of the season, and the procedure also includes praying, lighting incense and presenting votive offerings, such as food and liquor (Martell 2011: 54).

Apart from the discovery of fine wares, evidence of ceremonial activity at salt-works may adopt the form

Figure 7. Brine-boiling area in Molino Sanchón II: note the pit-holes (photo: the authors).

of ritual pits, such as those excavated at Provadia-Solnitsata, in Bulgaria (Nikolov 2012: 39-55) or at Molino Sanchón II itself (Abarquero *et al.* 2012). The deliberate deposition of certain objects within brine-processing facilities has also been attested to. This is the case of some brine-wells on a Roman salt-working site at Jersey Way, in Middlewich, Britain (Zant 2016), and, once again, two well-pits at Molino Sanchón II have provided similar evidence (Abarquero *et al.* 2012). Occasionally salt-works served as burial grounds, as indicated by the discovery of some graves at Provadia-Solnitsata (Nikolov 2012: 39-55). Burials have also been witnessed in Mexican salt-works (Castellón 2007: 458). At the Bronze Age site of Pla de la Guineu (Gerri de la Sal, Lérida, Spain) two individual tombs without grave goods have been recently reported in a brine-boiling area (Piera 2015). Returning to Villafáfila, the other brine-boiling centre excavated there, namely, the Early Bronze Age site of Santioste, produced a burial pit of a girl and, close to it, the votive offering of a complete calf (Abarquero *et al.* 2012). Maybe all these practices also comprised the consumption of special foods and alcoholic drinks in the course of propitiatory ceremonies, the aim of which was to successfully exploit the mineral resources (Guerra *et al.* 2015). In any case, there is no doubt that fines wares, at least in the case of Beaker pots in Molino Sanchón II, are not directly related to the technical processes involved in the salt-processing.

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References

Abarquero Moras, F. J., Guerra Doce, E., Delibes de Castro, G., Negredo García, M. J., Palomino Lázaro, Á. L., Morales Parras, M. J., Rodríguez Rodríguez, E. and Del Val Recio, J. 2010a. Lecturas de una prospección: el poblamiento prehistórico en Villafáfila entre el Neolítico y la Edad del Hierro. In F. J. Abarquero Moras and E. Guerra Doce (eds.), *Los yacimientos de Villafáfila (Zamora) en el marco de las explotaciones salineras de la Prehistoria europea:* 119-152. Valladolid, Junta de Castilla y León.

Abarquero Moras, F. J., Guerra Doce, E., Delibes de Castro, G., Palomino Lázaro, Á. L. and del Val Recio, J. 2010b. Excavaciones en los 'cocederos' de sal prehistóricos de Molino Sanchón II y Santioste

(Villafáfila, Zamora). In F. J. Abarquero Moras and E. Guerra Doce (eds.), *Los yacimientos de Villafáfila (Zamora) en el marco de las explotaciones salineras de la Prehistoria europea:* 85-118. Valladolid, Junta de Castilla y León.

Abarquero Moras, F. J., Guerra Doce, E., Delibes de Castro, G., Palomino Lázaro, Á. L. and del Val Recio, J. 2012. *Arqueología de la sal en las Lagunas de Villafáfila (Zamora): Investigaciones sobre los cocederos prehistóricos*. Valladolid, Junta de Castilla y León.

Abarquero Moras, F. J., Guerra Doce, E., Delibes de Castro, G. and López Sáez, J. Á. 2017. La explotación de la sal durante la Prehistoria en las Lagunas de Villafáfila (Zamora): Los cocederos de Molino Sanchón II y Santioste. *Cuaternario y Geomorfología* 31, 1-2: 7-24.

Alexianu, M., Dumitroaia, G. and Monah, D. 2007a. The exploitation of the salt-water sources in Moldavia: An ethno-archaeological approach. In D. Monah, Gh. Dumitroaia, O. Weller and J. Chapman (eds.), *L´exploitation du sel à travers le temps*: 279-298. Piatra-Neamt, Constantin Matasă (Biblioteca Memoriae Antiquitatis XVIII).

Alexianu, M., Weller, O. and Brigand, R. 2007b. Approche ethnoarchéologique de l´exploitation des sources salées de Moldavie: Les enquêtes récentes. In N. E. Morère Molinero (ed.), *Las salinas y la sal de interior en la Historia: Economía, medioambiente y sociedad* 1. (Actas del Congreso Internacional 6-10 de septiembre de 2006, Sigüenza, Guadalajara): 407-434. Madrid, Dykinson.

Alexianu, M., Weller, O. and Curcă, R. G. (eds.) 2011. *Archaeology and Anthropology of Salt: A Diachronic Approach. Proceedings of the International Colloquium, 1-5 October 2008, Al. I. Cuza University (Iaşi, Romania)*. Oxford, Archaeopress, British Archaeological Reports International Series 2198.

Andonova, M. and Nikolov, V. 2021. Pots on mats: mat-impressed salt-extraction pottery at Chalcolithic Provadia-Solnitsata, Bulgaria. *Antiquity* 96, 385: 51-66.

Ard, V. and Weller, O. 2012. Les vases de 'type Champ-Durand': témoins d'une exploitation du sel au Néolithique récent dans le Marais poitevin. In R. Joussaume (ed.), *L'enceinte néolithique de Champ-Durand à Nieul-sur-l'Autise (Vendée)*: 319-343. Chauvigny, Association des Publications Chauvinoises (Mémoire XLIV).

Blas Cortina, M. A. de. 2010. El expolio del subsuelo y las prácticas rituales en la minería prehistórica: a propósito del hallazgo de esqueletos humanos en las explotaciones de cobre en Asturias. In J. A. Fernández-Tresguerres (ed.), *Cobre y oro. Minería y metalurgia en la Asturias prehistórica y antigua:* 126-169. Oviedo, Real Instituto de Estudios Asturianos.

Bodi, G. 2007. Experiments with Salt Crystallization. In D. Monah, Gh. Dumitroaia, O. Weller and J. Chapman (eds.), *L´exploitation du sel à travers le temps*: 89-97. Piatra-Neamt, Constantin Matasă (Biblioteca Memoriae Antiquitatis XVIII).

Brigand, R. and Weller, O. (eds.) 2015. *Archaeology of Salt: Approaching an Invisible Past*. Leiden, Sidestone Press.

Budd, P. and Taylor, T. 1995. The faerie smith meets the bronze industry: magic versus science in the interpretation of prehistoric metal-making. *World Archaeology* 27, 1: 133-143.

Castellón Huerta, B. R. 2007. Antiguos talleres de producción de panes de sal en Zapotitlán, Puebla, México. Problemas para su definición y estudio. In N. E. Morère Molinero (ed.), *Las salinas y la sal de interior en la Historia: Economía, medioambiente y sociedad* 1. (Actas del Congreso Internacional 6-10 de septiembre de 2006, Sigüenza, Guadalajara): 435-465. Madrid, Dykinson.

Ceja Acosta, J. A. 2011. El Salado-Ixtahuehue and Benito Juárez-Soconusco: An Ethno-Archaeological Study of Salt Pre-Industries of Southeast Veracruz, Mexico. In M. Alexianu, O. Weller, and R. G. Curcă (eds.), *Archaeology and Anthropology of Salt: A Diachronic Approach. Proceedings of the International Colloquium, 1-5 October 2008, Al. I. Cuza University (Iaşi, Romania)*: 37-48. Oxford, Archaeopress, British Archaeological Reports International Series 2198.

Delibes de Castro, G., Viñé Escartín, A. and Salvador Velasco, M. 1998. Santioste, una factoría salinera de los inicios de la Edad del Bronce en Otero de Sariegos (Zamora). In G. Delibes de Castro (ed.), *Minerales y metales en la Prehistoria Reciente. Algunos testimonios de su explotación y laboreo en la Península Ibérica:* 155-197. Valladolid, Universidad de Valladolid.

Delibes de Castro, G., García Rozas, R., Larrén Izquierdo, H. and Rodríguez Rodríguez, E. 2007a. Cuarenta siglos de explotación de sal en las Lagunas de Villafáfila (Zamora): De la Edad del Bronce al Medioevo. In A. Fíguls and O. Weller (eds.), *1ª Trobada Internacional d´arqueología envers l´explotació de la sal a la prehistòria i protohistòria. Cardona, 6-8 de desembre del 2003*: 111-143. Cardona, Institut de recerques envers la Cultura (Archaeologia Cardonensis I).

Delibes de Castro, G., Fernández Manzano, J., Rodríguez Rodríguez, E. and del Val Recio, J. 2007b. Molino Sanchón II: Un salín de época campaniforme en Las Lagunas de Villafáfila (Zamora). In N. E. Morère Molinero (ed.), *Las salinas y la sal de interior en la Historia: Economía, medioambiente y sociedad* 1. (Actas del Congreso Internacional 6-10 de septiembre de 2006, Sigüenza, Guadalajara): 47-72. Madrid, Dykinson.

Delibes de Castro, G. and del Val Recio, J. 2007-2008. La explotación de la sal al término de la Edad del Cobre en la Meseta central española: ¿fuente de riqueza e instrumento de poder de los jefes Ciempozuelos? *Veleia* 24-25: 791-811.

Delibes de Castro, G., Guerra Doce, E. and Abarquero Moras, F. J. 2016. Rituales campaniformes en

contextos no funerarios: La factoría salinera de Molino Sanchón II (Villafáfila, Zamora). *ARPI: Arqueología y Prehistoria del interior peninsular 4 Extra: Homenaje a Rodrigo de Balbín Behrmann.* Madrid, Universidad de Alcalá: 286-297.

Eliade, M. 1978. *The forge and the crucible*. Chicago, University of Chicago Press.

Fíguls, A. and Weller, O. (eds.) 2007. *1ª Trobada internacional d'arqueologia envers l'explotació de la sal a la prehistòria i protohistòria. Cardona, 6-8 de desembre del 2003*: 199-218. Cardona, Institut de Recerques envers la Cultura.

Gouletquer, P. and Weller, O. 2015. Techniques of salt making: from China (Yangtze River) to their world context. In R. Brigand and O. Weller (eds.), *Archaeology of Salt: Approaching an Invisible Past*: 13-27. Leiden, Sidestone Press.

Guerra Doce, E. 2006. Exploring the significance of Beaker pottery through residue analyses. *Oxford Journal of Archaeology* 25, 3: 247-259.

Guerra Doce, E. 2016. Salt and Beakers in the third millennium BC. In E. Guerra Doce and C. Liesau von Lettow-Vorbeck (eds.), *Analysis of the Economic Foundations supporting the Social Supremacy of the Beaker Groups. Proceedings of the XVII UISPP World Congress (1-7 September, Burgos, Spain). Volume 6: Session B36*: 95-110. Oxford, Archeopress Archaeology.

Guerra Doce, E., Delibes de Castro, G., Abarquero Moras, F. J., del Val Recio, J. and Palomino Lázaro, Á. L. 2011. The Beaker Salt Production Centre of Molino Sanchón II, Zamora, Spain. *Antiquity* 85, 329: 805-818.

Guerra Doce, E., Abarquero Moras, F. J., Delibes de Castro, G., Palomino Lázaro, Á. L. and del Val Recio, J. 2012. Das Projekt ´Salzarchäologie` der Lagunen von Villafáfila (Zamora): Ausgrabungen in den prähistorischen Salzsieden Molino Sanchón II und Santioste. *Madrider Mitteilungen* 53: 85-133.

Guerra Doce, E., Abarquero Moras, F. J., Delibes de Castro, G., Palomino Lázaro, Á. L. and del Val Recio, J. 2015. Bell Beaker pottery as a symbolic marker of property rights: The case of the salt production centre of Molino Sanchón II, Zamora, Spain. In M. P. Prieto Martínez and L. Salanova (eds.), *The Bell Beaker Transition in Europe: Mobility and local evolution during the 3rd millennium BC:* 169-181. Oxford, Oxbow Books.

Guerra Doce, E., Abarquero Moras, F. J. and Delibes de Castro, G. 2017. Una nueva propuesta sobre el moldeado de la sal en la factoría prehistórica de Molino Sanchón II (Villafáfila, Zamora). In J. Fernández Eraso, J. A. Mujika Alustiza, A. Arrizabalaga and M. García Diez (eds.), *Miscelánea en homenaje a Lydia Zapata Peña (1965-2015)*: 471-494. Bilbao: Universidad del País Vasco.

Guerra Doce, E., Abarquero Moras, F. J. and Delibes de Castro, G. 2019. Sal y estrategias de poder en los territorios Ciempozuelos. In G. Delibes, and E. Guerra (coords.), ¡Un *brindis por el príncipe!: El vaso campaniforme en el interior de la Península Ibérica (2500-2000 A.C.) 2*: 163-180. Madrid, Museo Arqueológico Regional.

Harding, A. 2013. *Salt in Prehistoric Europe*. Leiden, Sidestone Press.

Hees, M. 2002. Neue Experimente zur latènezeitlichen Salzgewinnung: Das Briquetage von Schwäbish Hall. In *Experimentelle Archäologie in Deutschland, Bilanz 2001*: 27-32. Oldenburg, Archäologische Mitteilungen aus Nordwestdeutschland.

Horiuchi, A., Ochiai, N., Kurozumi, H. and Miyata, Y. 2011. Detection of chloride from pottery as a marker for salt: A new analytical method validated using simulated saltmaking pottery and applied to Japanese ceramics. *Journal of Archaeological Science* 38, 11: 2949-2956.

Jimeno Martínez, A. 1988. La investigación del Bronce Antiguo en la Meseta Superior. *Trabajos de Prehistoria* 45: 103-121.

Liot, C. 2002. 'Briquetages' et production de sels par lessivage de terres salées au Mexique. In O. Weller (ed.), *Archéologie du sel: Techniques et sociétés dans la Pré- et Protohistoire européenne. Actes du Colloque 12.2 du XIVe Congrès e UISPP, 4 septembre 2001, Liège et de la Table Ronde du Comité des Salines de France, 18 mai 1998*: 81-98. Rahden/West, Leidorf.

Martell Contreras, M. L. 2011. The saltmakers of Soconusco and Benito Juárez: an interpretation of ethnoarchaeological data from the perspective of gender and identitiy. In M. Alexianu, O. Weller, and R. G. Curcă (eds.), *Archaeology and Anthropology of Salt: A Diachronic Approach. Proceedings of the International Colloquium, 1-5 October 2008, Al. I. Cuza University (Iaşi, Romania)*: 49-55. Oxford, Archaeopress, British Archaeological Reports International Series 2198.

Munteanu, R., Garvăn, D., Nicola, D., Preoteasa, C. and Dumitroaia, G. 2007. Cucuieţi – Slatina Veche (Romania). Prehistoric Exploitation of a Salt Resource. In D. Monah, Gh. Dumitroaia, O. Weller and J. Chapman (eds.), *L´exploitation du sel à travers le temps*: 57-70. Piatra-Neamt, Constantin Matasă (Biblioteca Memoriae Antiquitatis XVIII).

Nikolov, V. 2012. *Salt, early complex society, urbanization: Provadia-Solnitsata (5500-4200 BC)*. In V. Nikolov and K. Bacvarov (eds.) 2012. *Salz und Gold: die Rolle des Salzes im prähistorischen Europa: Akten der internationaler Fachtagung (Humboldt-Kolleg) in Provadia, Bulgarien 30 September-4 Oktober 2010 = Salt and Gold: The Role of Salt in Prehistoric Europe. Proceedings of the International Symposium (Humboldt-Kolleg) in Provadia, Bulgaria 30 September-4 October 2010*: 11-65. Provadia-Veliko Tarnovo, Faber.

Nikolov, V. and Bacvarov, K. (eds.) 2012. *Salz und Gold: die Rolle des Salzes im prähistorischen Europa: Akten der internationaler Fachtagung (Humboldt-Kolleg) in Provadia, Bulgarien 30 September-4 Oktober 2010 = Salt and Gold: The Role of Salt in Prehistoric Europe. Proceedings of the International Symposium (Humboldt-*

Kolleg) in Provadia, Bulgaria 30 September-4 October 2010. Provadia-Veliko Tarnovo, Faber.

Odriozola Lloret, C. P. and Martínez-Blanes, J. M. 2012. Cerámica para la producción de sal en Villafáfila: estudio tecnofuncional a la luz de los análisis de pasta. In F. J. Abarquero Moras, E. Guerra Doce, G. Delibes de Castro, Á. L. Palomino Lázaro and J. del Val Recio (eds.), *Arqueología de la sal en las Lagunas de Villafáfila (Zamora): Investigaciones sobre los cocederos prehistóricos*: 435-465. Valladolid, Junta de Castilla y León.

Pétrequin, P., Weller, O., Gauthier, É., Dufraisse, A. and Piningre J. F. 2001. Salt spring exploitation without pottery during Prehistory. From New Guinea to the French Jura. In S. Beyries and P. Pétrequin (eds.), *Ethno-Archaeology and its Transfers*: 37-65. Oxford, Archeopress, British Archaeological Reports International Series 983.

Piera Teixidó, M. 2015. El Pla de la Guineu: primeres evidències d´ explotació de la sal en época del bronze (Gerri de la Sal). 142-147. In *Primeres Jornades d´Arqueologia i Paleontologia del Pirineu i Aran. Coll de Nargó i la Seu d´Urgell, 29 i 30 de noviembre de 2013*. [Lleida], Generalitat de Catalunya.

Rodríguez Marcos, J. A. 2008. *Estudio secuencial de la Edad del Bronce en la Ribera del Duero (Provincia de Valladolid)*. Valladolid, Junta de Castilla y León.

Rodríguez Rodríguez, E. 2000. *Historia de las explotaciones salinas en las Lagunas de Villafáfila. Zamora*. Zamora, Instituto de Estudios Zamoranos Florián de Ocampo.

Siret, L. 1913. *Questions de chronologie et d´ethnographie ibériques. Tome I: De la fin du Quaternaire a la fin du Bronze*. Paris, Paul Geuthner.

Tencariu, F. A., Alexianu, M., Cotiugă, V., Vasilache, V. and Sandu, I. 2015. Briquetage and salt cakes: an experimental approach of a prehistoric technique. *Journal of Archaeological Science* 59: 118-131.

Valiente Cánovas, S., Gea García, A., López Cidad, J. F. and Ayarzagüena Sanz, M. 2003. Algunos datos sobre cesteria y fibras vegetales aplicadas a vasijas en barro de la Edad del Bronce en las 'Salinas de Espartinas (Ciempozuelos, Madrid)'. *Pátina* 12: 101-108.

Viñé, A. I., Martín, A. M. and Rubio, P. 1990. Excavación de urgencia en ´Santioste`, Otero de Sariegos. *Anuario del Instituto de Estudios Zamoranos Florián de Ocampo*: 89-104.

Viñé, A. I., Salvador, M., Iglesias, L., Rubio, P. and Martín, A. M. 1991. Nuevos datos acerca del yacimiento de Santioste, Otero de Sariegos (2ª Campaña de excavación). *Anuario del Instituto de Estudios Zamoranos Florián de Ocampo*: 175-190.

Weller, O. (ed.) 2002. *Archéologie du sel: Techniques et sociétés dans la Pré- et Protohistoire européenne. Actes du Colloque 12.2 du XIVe Congrès de UISPP, 4 septembre 2001, Liège et de la Table Ronde du Comité des Salines de France, 18 mai 1998, Paris*. Rahden/West, Leidorf.

Weller, O. 2012. La production chalcolithique du sel à Provadia-Solnitsata: de la technologie céramique aux implications socio-économiques. In V. Nikolov and K. Bacvarov (eds.), *Salz und Gold: die Rolle des Salzes im prähistorischen Europa: Akten der internationaler Fachtagung (Humboldt-Kolleg) in Provadia, Bulgarien 30 September-4 Oktober 2010 = Salt and Gold: The Role of Salt in Prehistoric Europe. Proceedings of the International Symposium (Humboldt-Kolleg) in Provadia, Bulgaria 30 September-4 October 2010*: 67-87. Provadia-Veliko Tarnovo, Faber.

Weller, O. 2015. First salt making in Europe: a global overview from Neolithic times. In R. Brigand and O. Weller (eds.), *Archaeology of Salt: Approaching an Invisible Past*: 67-82. Leiden, Sidestone Press.

Zant, J. 2016. Excavations on a Roman Salt-working Site at Jersey Way, Middlewich, Cheshire. *Archaeological Journal* 173, 1: 56-153.

Assessing the Role of Salt in the Spread of the Beaker Phenomenon across Western Europe during the Third Millennium BC

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Abstract

This paper focuses on the production of salt and its socio-economic implications in Europe during the 3rd millennium BC. In Iberia, where Beaker pottery may have originated, there is an association of salt resources with Beaker groups. We suggest here that Beaker groups might have assumed control over the circulation of salt in Western Europe. The role of salt in the spread of Beaker material culture is assessed, both as an exchange commodity in its own right, and also as a food preservative, facilitating the movement of peoples and long-distance journeys.

Keywords: Salt, Europe, Third Millennium BC, Beaker phenomenon, circulation.

Introduction

By the mid-third millennium BC, the (Bell) Beaker phenomenon spread over Western and Central Europe and the north of Africa. While it is named after its distinctive pottery, adopting the form of an inverted bell, the so-called Beaker assemblages also includes other objects related to war and hunting. It is now widely accepted that all these artefacts were symbols of power common to socially prominent individuals in the late third and early second millennia BC. However, the strategies employed by these individuals to attain such privileged statuses are not well documented.

Different options have been considered to explain the rapid spread of a ´Beaker package` and its acceptance by Late Neolithic-Early Bronze Age societies (Guerra and Liesau 2016). Control over exchange networks might have helped Beaker groups achieve high social status, as suggested by the proximity of Beaker sites to natural routes of communication. Copper metallurgy may have also been controlled by Beaker groups, in a similar way to certain raw materials and prestige products elsewhere (gold, cinnabar, ivory). In Iberia, where Beaker pottery may have originated, Ciempozuelos sherds, one of the Iberian regional styles, are quite commonly found in the vicinity of saline resources. This has given rise to the suggestion that the exploitation of salt in Central Iberia was also managed by Ciempozuelos Beaker groups by the late 3rd millennium BC (Delibes *et al*. 2007; Delibes and del Val 2007-2008; Guerra *et al.* 2019).

The relation between Beaker pottery and salt processing might have started earlier. During the late 4th-early 3rd millennia BC there is increased evidence of salt processing in Iberia, and it tends to concentrate in the Southwestern area, especially in Portuguese Estremadura (Valera 2017), the cradle of the Maritime or International pots. Taking this into consideration, we have developed the hypothesis that the origin and spread of this ceramic style might be linked to salt processing (Guerra 2016, 2017). The aim of this paper is to further explore this idea, and to assess the role of salt in the diffusion of the Beaker phenomenon across Europe.

The starting point: the association of Beaker pottery with saline resources in Iberia

The spatial relationship between Beaker pottery or, more specifically, the Ciempozuelos variant -one of the late regional styles that spread over Central Iberia- and saline resources has long been apparent. It was Professor Germán Delibes who observed that Beaker (Ciempozuelos) graves situated in the sedimentary soils on the left bank of the Duero river, such as Fuente Olmedo, Pajares de Adaja, Samboal, Portillo or Villaverde de Íscar, tended to be located near to inland saline resources (either salt lakes of endorheic origin or salt springs) (Delibes *et al.* 2007) (Figure 1). Thus, he suggested that Ciempozuelos Beaker elites in that region might have managed the exploitation of salt (Delibes and del Val 2007-2008).

A similar situation has been attested to southwards, on the other side of the Central System mountain range. For instance, several sites providing Beaker pottery (Ciempozuelos and occasionally International sherds) have been documented in the Salado (the Spanish term for Salty) Valley close to Sigüenza, in the province of Guadalajara (Malpica *et al.* 2011: 182; Morère 2007:

Figure 1. Grave goods from the Beaker (Ciempozuelos) burial of Perro Alto, in Fuente Olmedo (Valladolid, Spain): the Ciempozuelos pottery set consisting of Bell Beaker, bowl and carinated bowl; a golden ribbon, a tanged copper dagger, eleven Palmela points, a stone wristguard and a flint arrowhead (Photo: Courtesy of Museo de Valladolid).

6-7). Moreover, at one of these sites, El Perical, in Alcolea de las Peñas, there are some quadrangular depressions carved in limestone outcrops that could have functioned as basins for the evaporation of brine (Jiménez Guijarro 2011). In the confluence of the lower course of the Jarama River and the Tagus, between the provinces of Madrid and Toledo, a number of sites have provided Ciempozuelos sherds in the vicinity of saline sources (Valiente 2005-2006). In Toledo salt residues also have been reported in a pot found in one of the huts excavated at the Copper Age settlement of Los Picos-El Fontarrón (Huecas), which is located close to the Beaker burials of the Copper Age cemetery of Valle de Higueras (Bueno *et al.* 2010). However, the association of Ciempozuelos pottery and saline sources is not limited to Central Iberia. Some Ciempozuelos sherds have been documented at the medieval brine-boiling salt-work of Fuente Camacho (Loja, Granada) in Andalusia (Terán and Morgado 2011).

Archaeological excavations carried out at some of these sites show that Beaker sherds appear in the actual salt-processing areas. This is the case of Salinas de Espartinas, located in Ciempozuelos,[1] in southern Madrid, where Beaker pottery, together with briquetage, has been recovered in burned areas, interpreted as fires resulting from the process of boiling brine (Valiente *et al.* 2002; Valiente and Ramos 2009). There is circumstantial evidence for brine-boiling at the Pontón Chico site, in Seseña, Toledo. This is indicated by the discovery of clay pedestals and accumulations of coarse pottery vessels in firing structures filled with ashes and charcoal. Once again, Ciempozuelos Beaker pottery has been recovered at the site (Arribas 2010). Excavations at the brine-boiling site of Valle Salado (Salt Valley) in Añana (Vitoria) have also revealed Ciempozuelos sherds at the Copper Age levels (Plata and Martínez 2014). But it is at the brine-boiling site of Molino Sanchón II (Villafáfila, Zamora) where the presence of Ciempozuelos Beaker sherds is more abundant, since over a thousand sherds have been unearthed (Abarquero *et al.* 2012; Guerra *et al.* 2012), and for which a ritual role has been suggested (Delibes *et al.* 2007; Delibes and del Val 2007-2008; Guerra *et al.* 2011, 2015; see also Guerra *et al.* this volume). For the moment, the association of Beaker pottery to saline sources seems to be confined to Iberia.[2] At the Fontaines Salées, Saint-Pere-sous-Vézelay (Yonne, France) some wooden wells from which brine was extracted have been dated dendrochronologically to the 23rd century BC, that is to say, contemporary with the Bell Beaker phenomenon (Bernard *et al.*, 2008); however, no Beaker sherds have been recovered there.

Before Beaker times? Evidence for salt processing in Iberia during the Neolithic and pre-Beaker Copper Age

The earliest evidence for salt exploitation in Iberia documented so far dates back to the mid-fifth millennium BC. Throughout the Middle Neolithic (4500-3500 BC), rock salt was extracted from the Muntanya de Sal outcrop at Cardona (Barcelona, Spain) by employing ground stone tools, such as those abundantly found in the vicinity of the saline

[1] This locality gives its name to the most distinctive Beaker style in Central Iberia, which was first detected during the excavation of the cemetery of Cuesta de la Reina at the end of 19th century (Riaño *et al.* 1894).

[2] Since this congress was held, several other saline resources in Iberia have provided Beaker sherds in their surroundings (see Guerra *et al.* 2019 for references).

diapir (Fíguls *et al.* 2007; Weller 2002a). Moreover, the presence of certain objects and raw materials, the origin of which is clearly non-local, is indicative of the existence of exchange networks, through which salt might soon have circulated (Weller *et al.* 2007). Indeed, the presence of residues interpreted as salt has been reported in one pot found at the nearby Neolithic settlement of Ca l´Oliaire (Martín *et al.* 2007).

By the mid-fifth millennium BC the discovery of a few pottery sherds corresponding to the Middle Neolithic (Martínez *et al.* 2013) suggests that salt processing may also have started at the Valle Salado, in Añana (Vitoria, Spain). Then, after a period of abandonment, the activity at the salt springs of Añana is restored in pre-Beaker times (Plata and Martínez 2014).

There is evidence for salt-processing on the Atlantic coastline of South-west Iberia from at least the late 4th millennium BC. Several Middle Neolithic coastal sites indicate the development of brine-processing activities as a result of the recovery of large amounts of briquetage (discarded large coarse ceramic pots, clay pedestals) in association with areas of burning. This is the case of certain Portuguese sites, such as Barrosinha and Malhada Alta, in the Sado estuary (Soares and Tavares 2013: 160). The Late Neolithic site of La Marismilla (Puebla del Río, Sevilla, Spain), formerly at the mouth of the Guadalquivir, may have operated as a brine-boiling site for processing sea water, as suggested by the presence of massive deposits of pottery sherds and clay pedestals within 17 basins; however, no charcoal has been found there (Escacena *et al.* 1996.)

In the transition 4th/3rd millennia BC, culturally between the Late Neolithic and beginning of the Copper Age, there is an intensification of salt exploitation between the Sado and Tagus estuaries (Valera 2017), the latter being the area where Bell Beaker pottery is said to have appeared for the first time. Massive accumulations of briquetage have been found at Ponta da Passadeira (Soares 2001, 2008; 2013a) and Monte da Quinta 2 (Valera *et al.,* 2006), in the Tagus estuary; further south, in the Sado estuary, Possanco has provided similar evidence (Soares and Tavares 2013: 163), as well as Praia do Forte Novo, in the Algarve region (Rocha 2013). These primarily consist of clay pedestals and large numbers of ceramic sherds that mainly correspond to open pots with conical profiles and flat bottoms. In the case of Monte da Quinta 2, where the excavation was carried out in an area of 30m2, pottery sherds were counted in the tens of thousands, and their total weight was estimated at approximately one ton (Valera *et al.* 2006: 293). The excavated area at Ponta da Passadeira is 120m2, and over a ton of pottery sherds were unearthed there (Soares 2008: 361). At Praia do Forte Novo the excavation centered on a 13m2-trench, which provided 7562 ceramic sherds.

Therefore, these large accumulations of pottery clearly demonstrate that the production of salt was not intended for the local market but for exchange (Valera *et al.* 2006: 296). In that sense, Soares *et al.* (2013: 189) have developed a model of exchange networks on a regional scale through which salt may have circulated; these would have connected the Tagus estuary to inner territories in the middle Guadiana River basin, as suggested by the occurrence of shells of marine mollusks at sites located hundreds of kilometers from the seashore. This would be indicative of the existence of a spatial labour-division, by which prehistoric societies close to the mouth of the Tagus would have been involved in fishing, shell-fishing and processing seawater for the production of salt; on the other hand, groups in the inland territories of the Southwestern area of Iberia would have been in charge of farming and stockbreeding (Figure 2).

Cassen and Weller (2013: 271 and fig. 6) have reported the typological similarity of the ceramic vessels involved in salt processing from late 4th/early 3rd millennia BC sites in Portuguese Estremadura and pots recovered at some Final Neolithic ditched enclosures from the area of France´s Atlantic marshes between the Loire and the Gironde. This has led us to infer an interaction between prehistoric societies from the two cultural spheres, which obviously would not be exclusively aimed at trading salt but other goods and commodities. This interaction may have been physically carried out along previous routes that operated from the Early Neolithic and connected these two regions, hence the presence of impressed pottery resembling Mediterranean Cardial Ware at some French sites from the Atlantic coast, for which R. Joussaume (1986) coined the term Early Centro-Atlantic Neolithic. If these contacts implying long-distance journeys actually took place on a regular basis, then salt would have been crucial for the preservation of food.

Was the salt trade behind the spread of the Beaker phenomenon?

Recently we have developed a hypothesis about the role of salt in the spread of Beaker pottery along the Atlantic coast (Guerra 2016). We maintain that the intensification of the production of salt that occurred during the late 4th/early 3rd millennia BC in Portuguese Estremadura would have suggested trading with this product along the Atlantic coast and eventually reached the North of Europe. Salt might have been transported in sachets or baskets, possibly the ultimate inspiration for the Maritime or International variant of Beaker pottery (Guerra 2017).

In fact, ceramic pots of this type follow a fixed design, both in form and decoration; this is the reason why Salanova (2000) refers to the Maritime Beaker pots as

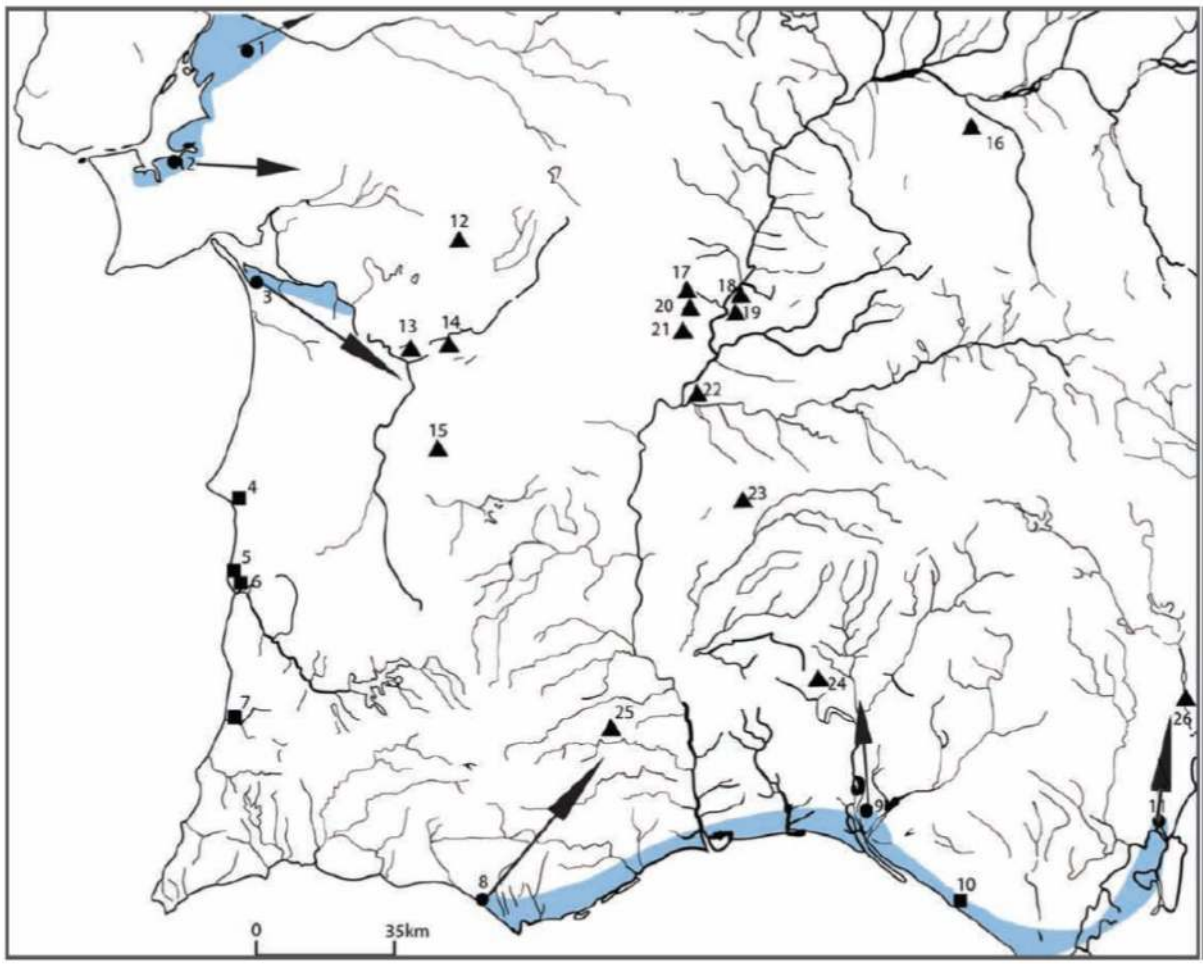

Figure 2. Map showing probable sea salt trading routes during the late 4th/early 3rd millennia BC in the Southwestern area of Iberia. Black dots correspond to salt-producing sites (after Soares 2013a).

the standard. One of the principles in the circulation of salt, which has been ethnographical and historically attested to, is that when it is involved in long-distance exchanges it is traded in hard salt cakes, as units. '*By its composition, its aspect, its shape, and, eventually the designs decorating its surface or the quality of its packaging, this unit points out the producing group, far from the production site*' (Gouletquer and Weller 2015: 24). According to O. Weller (2015: 72): '*The use of ceramic moulds of practically identical shapes and volumes by each cultural group attests to the commitment to produce and package the salt according to a predefined shape, compact and easy to transport. The production is not aimed at simply producing salt, but salt cakes of a standardised quality, size and weight. The salt cake thus becomes a social object, an identity marker of the producers. In this form, it will circulate conveniently, be divided without losing its use value, and be stored for many years*'.

Maritime Beakers meet all these requirements. Additionally, in support of our idea, there are some examples illustrating the presence of textiles in Beaker contexts from Portugal (for information about organic containers in salt-works, see Guerra *et al.* this volume). This is the case of the linen cloth used to wrap a copper axe, which was unearthed at mound 1 of the cemetery of Belle France (Caldas de Monchique, Portugal) and AMS radiocarbon dated to the middle/third quarter of the 3rd millennium BC (Soares and Ribeiro 2003, cit. in Soares 2013b: 391). Among the grave goods deposited in Burial pit 1 at enclosure (*recinto*) 1 of Bela Vista 5 (Mombeja, Beja, Portugal), a Palmela point shows some fibers corresponding to a piece of cloth made of linen or hemp, which may be dated to the last quarter of the 3rd millennium BC (Varela 2014).

Remarkably, an active salt route connecting the Portuguese ports of Setúbal and Aveiro to the North of Europe actually operated from the Middle Ages until the end of the 18th century (Antunes 2008). On their way to Northern Europe, Portuguese salt-traders might have stopped off along the Atlantic coast of Northwestern Iberia. There is evidence for the production of salt here since the Iron Age (the *Cultura Castreja*), at least in the Portuguese territories north of the Duero (Almeida 2005), and slightly later in the Spanish region of Galicia,

where climatic conditions prevented the exploitation of sea-salt before Roman times, as revealed for the excavation of the O Areal saltern, in Vigo (Pontevedra, Spain) (Castro 2006). Despite this, medieval texts refer to the importation of salt from Aveiro by local communities (Almeida 2005). The production of salt in other territories further north also did not prevent the arrival of Portuguese salt, as observed in England during the Modern Period (Barros 2005), and even as far as Russia, where Setúbal salt was known for its quality, and was used for preparing the fish in the Tsar's court (Kraikovski and Lajus 2005).

While the question of the origins of the Bell Beaker phenomenon, as well as the mechanisms involved in its spread, are still an ongoing debate, at this moment the Tagus estuary, from where the Maritime or International pots would have reached the Lower Rhine via the Atlantic façade, is one of the most accepted options (Cardoso 2014; Carvalho-Amaro 2013; Kunst 2001; Salanova 2004). It is worth remarking that this is exactly the same route through which salt circulated from Portugal to Amsterdam since the Middle Ages.

When considering the circulation of salt and the exchange networks connecting the Atlantic coast to the middle Guadiana basin during the Copper Age, Soares (2013b: 384) points out an increase in the circulation of prestige goods in the transition from the Beaker horizon to the Early Bronze Age; nevertheless, in relation to salt '*Salt-producing sites in south-west Iberia date back to the late 4th-early 3rd millennium BC. Those corresponding to the second half of the 3rd millennium BC, which would have supplied the middle Guadiana basin, have yet to be located*'. Indeed, no Beaker salt-production site has been documented so far on the Atlantic coast of Portugal. However, the detection of sodium chloride on a Maritime Beaker recovered at mound 242, As Pontes de García Rodríguez (La Coruña) in the Spanish region of Galicia (Fernández Ibáñez 1991), seems to support our hypothesis (Figure 3).

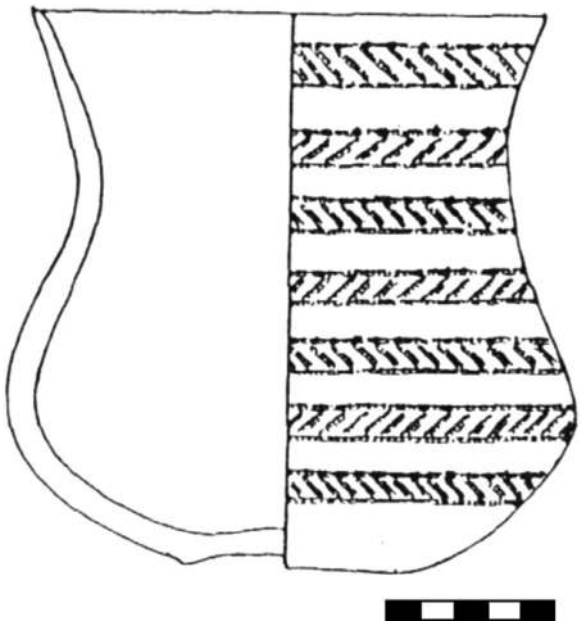

Figure 3. Maritime Bell Beaker with salt residues, from mound 242 (As Pontes de García Rodríguez, La Coruña, Spain) (after Fernández Ibáñez 1991).

Europe in the third millennium BC: Beaker- vs. Non-Beaker adopting groups

The archaeological information available for the Old World shows that the 3rd millennium BC witnessed the emergence of exceptionally wide communication and exchange networks. An increasing number of materials started to circulate over much longer distances. Consequently, in some regions this has led to concepts such as the 'age of exchange' (Risch *et al.* 2015: 15-17).

Due to the uneven geographical distribution of saline resources, regions lacking them have traditionally depended upon the supply of salt from salt-rich areas. Therefore, salt-trading routes were soon developed, and this activity was a major factor of power and wealth for the exploitation and distribution centres. Focusing our attention on Prehistoric Europe, almost from the very moment in which prehistoric societies started to exploit salt to a considerable extent in the Neolithic, there is evidence that it was traded over long distances (Cavruc and Harding 2012; Monah 2012, 2015; Nikolov 2010; Saile 2012; Tasic 2002; Weller 2002; Weller *et al.* 2007). It has even been surmised that '*c´est le besoin du sel même qui déclencha le commerce en soi*' (Saile 2002: 225). However, in contrast with the archaeological record for salt processing in Iberia during the third millennium BC, for the rest of Europe there is not much information about similar activities. While some Corded Ware sites from Central Europe have provided briquetage, evidence for salt production there is not conclusive (Saile 2012).

According to Professor Anthony Harding, '*taking the third millennium as a whole, one has to admit that there is little specific evidence anywhere, other than some isolated radiocarbon dates that suggest activity was proceeding (for instance at Băile Figa, Romania)*' (Harding 2013: 88). As a matter of fact, there are no large accumulations of briquetage nor any major sites near salt sources, and this contrasts with the situation of the Bronze Age, when this activity reached industrial proportions in some areas. Probably the absence of evidence is not the evidence of absence: archaeological testimonies of salt production during the 3rd millennium BC are still to be found, as the need for salt would have remained the same as before.

In some territories (the British Isles, Northern Europe, the Baltic area), however, it seems that salt was not

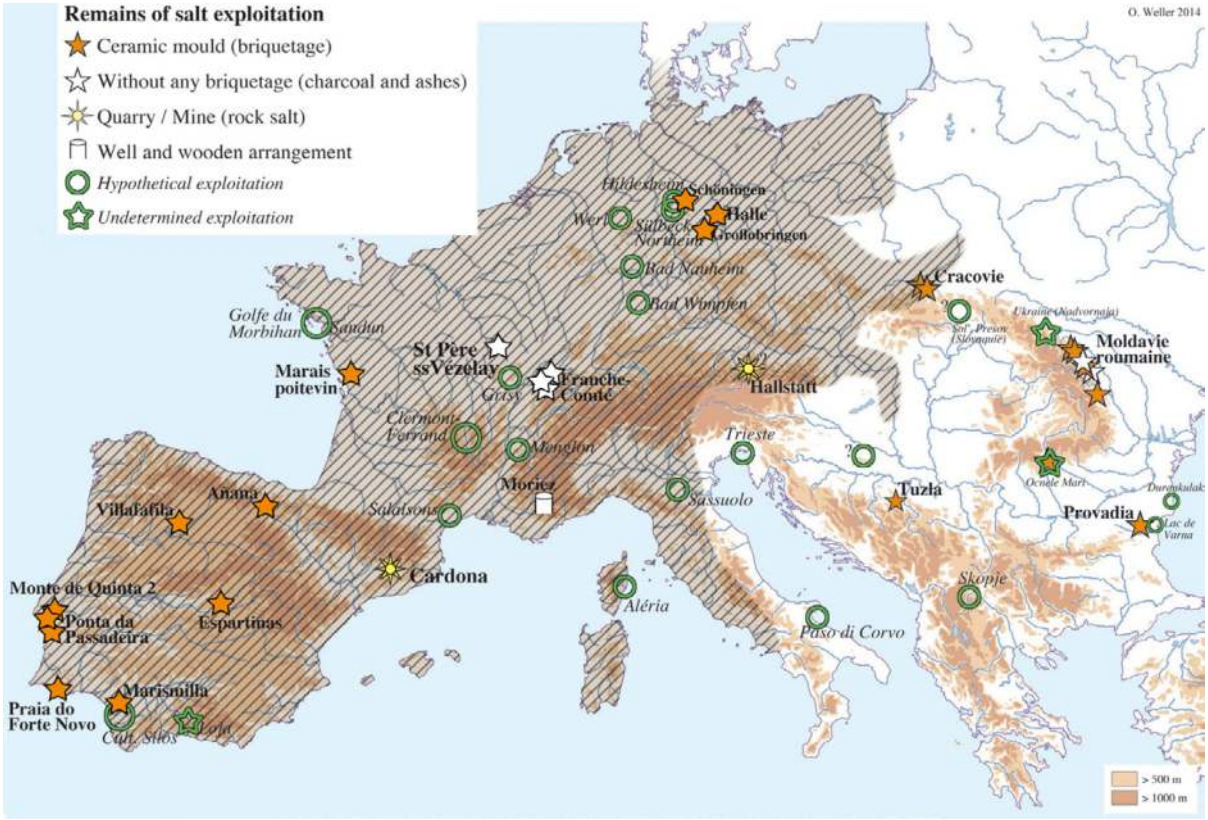

Figure. 4. Archaeological evidence of salt production in Europe during the Neolithic and Chalcolithic (c. 6000-2300 BC) (map courtesy of O. Weller). The stripe pattern shows the distribution of the Bell Beaker phenomenon across Europe (according to Heyd 2007b).

exploited on a considerable scale until the Bronze Age (Alexander 1982) for whatever reason (climatic conditions, lack of technical know-how, and so on). Therefore, these regions would have welcomed the arrival of salt through exchange networks.

Whether or not salt was involved in its diffusion, the Beaker phenomenon rapidly extended across Western and Central Europe, reaching Southern Scandinavia, some Western Mediterranean islands and parts of Northern Africa. Traditionally its eastern boundaries have been established within an arc spanning from the 13th-20th degree of eastern longitude. Some isolated Bell Beaker elements are being discovered beyond that point, possibly as a result of contacts between its core, that is, Western Europe, and the peripheries, where Beaker material culture arrived in an incomplete state and the ideology behind it was somewhat diluted (Heyd 2007a). In the latter territories, there is evidence of long-distance exchanges in which salt was involved from the 5th millennium BC (Figure 4). These connected the Carpathian-Danube region to the Pontic steppes (Cavruc and Harding 2012; Monah 2015), and the Varna culture on the western Black Sea coast to the Central Balkans, the Aegean and even northern Anatolia (Nikolov 2010). Therefore, the arrival of salt from Western Europe was unnecessary.

Concluding remarks

By no means do we intend to claim that the hypothetical scenario suggested here is the only explanation for the spread of Beaker material culture across Europe during the 3rd millennium BC, since such a complex and multi-dimensional phenomenon requires the concurrence of many factors. However, we believe that the role of salt in this process through the existing exchange networks is worthy of further investigation. Salt might have circulated as a traded commodity, but it would have also enabled the preservation of food during long-distance journeys, such as those in which Beaker groups were involved. The result of the oxygen isotope analysis in the Amesbury Archer's tooth enamel, indicating that this man originated from an Alpine region in Central Europe (Fitzpatrick 2011), is perhaps the most illustrative example.

When assessing the socio-economic implications of the production and circulation of salt in Prehistoric Europe, Olivier Weller calls attention to the need for a political geography of salt (Weller 201: 77-78). Europe in the 3rd millennium BC constitutes a good case study.

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References

Abarquero Moras, F. J., Guerra Doce, E., Delibes de Castro, G., Palomino Lázaro, Á. L. and del Val Recio, J. 2012. *Arqueología de la sal en las Lagunas de Villafáfila (Zamora): Investigaciones sobre los cocederos prehistóricos*. Valladolid, Junta de Castilla y León (Arqueología en Castilla y León, Monografías 9).

Alexander, J. 1982. The prehistoric salt trade in Europe. *Nature* 300, 16: 577-578.

Almeida, C. A. B. de 2005. A exploração do sal na costa portuguesa a Norte do Rio Ave. In I. Amorim (ed.), *I Seminário Internacional sobre o sal portugués*: 137-170. Porto: Instituto de História Moderna da Universidade do Porto.

Antunes C. A. P. 2008. The commercial relationship between Amsterdam and the Portuguese salt-exporting ports: Aveiro and Setubal, 1580-1715. *Journal of Early Modern History* 12: 25-53.

Arribas, R. 2010. El yacimiento arqueológico de la Edad del Bronce de Pontón Chico, Seseña, Toledo. In A. Madrigal and M. Perlines (eds.), *Actas de las II Jornadas de arqueología de Castilla-La Mancha (Toledo 2007)* 1: 72-100. Toledo, Junta de Castilla-La Mancha.

Barros Cardoso, A. 2005. O sal português nos cais de Londres e nos outros portos das Ilhas Britânicas (Séc. XVIII). In I. Amorim (ed.), *I Seminário Internacional sobre o sal portugués*: 211-230. Porto: Instituto de História Moderna da Universidade do Porto.

Bernard, V., Pétrequin, P. and Weller, O. 2008. Captages en bois à la fin du Néolithique: les Fontaines Salées à Saint-Père-sous-Vézelay. In Weller, O., Dufraisse, A, and Pétrequin, P. (eds.), *Sel, eau et forêt: D´hier à aujourd´hui*: 299-333. Besançon, Presses Universitaires de Franche-Comté, Cahiers de la MSH Ledoux 12 (coll. Homme et environnement 1).

Bueno Ramírez, P., Barroso Bermejo, R. and Balbín Behrmann, R. de. 2010. Entre lo visible y lo invisible: registros funerarios de la Prehistoria Reciente de la Meseta Sur. In P. Bueno, A. Gilman, C. Martín Morales and F. J. Sánchez Palencia (eds.), *Arqueología, sociedad, territorio y paisaje: Estudios sobre Prehistoria Reciente, Protohistoria y Transición al mundo romano en homenaje a Mª. Dolores Fernández-Posse*: 53-73. Madrid, CSIC.

Cardoso, J. L. 2014. Absolute chronology of the Beaker phenomenon North of the Tagus estuary: demographic and social implications. *Trabajos de Prehistoria* 71, 1: 56-75.

Carvalho-Amaro, G. 2013. Pre-Bell Beaker ware from Estremadura, Portugal, and its likely influence on the appearance of Maritime Bell Beaker ware. In P. Prieto Martínez and L. Salanova (eds.), *Current researches on Bell Beakers. Proceedings of the 15th International Bell Beaker Conference: From Atlantic to Ural. 5th-9th May 2011. Poio (Pontevedra, Galicia, Spain)*: 197-208. Santiago de Compostela, Galician ArchaeoPots.

Cassen, S. and Weller, O. 2013. Idées et faits relatifs à la production des sels marins et terrestres en Europe, du Vie au IIIe millénaire. In J. Soares (ed.), *Pré-História das Zonas Húmidas: Paisagens de Sal:* 255-304. Setúbal, Museu de Arqueologia e Etnografia do Distrito de Setúbal (Setúbal Arqueológica 14).

Castro Carrera, C. 2006. La salina romana de ‚O Areal', Vigo (Galicia). In J. C. Hocquet and J. L. Sarrazin (eds.), *Le Sel de la Baie: Histoire, archéologie, ethnologie des sels atlantiques*: 105-122. Rennes, Presses universitaires de Rennes.

Cavruc, V. and Harding, A. 2012. Prehistoric production and exchange of salt in the Carpathian-Danube region. In V. Nikolov and K. Bacvarov (eds.), *Salz und Gold: die Rolle des Salzes im prähistorischen Europa: Akten der internationaler Fachtagung (Humboldt-Kolleg) in Provadia, Bulgarien 30 September-4 Oktober 2010 = Salt and Gold: The Role of Salt in Prehistoric Europe. Proceedings of the International Symposium (Humboldt-Kolleg) in Provadia, Bulgaria 30 September-4 October 2010*: 173-200. Provadia-Veliko Tarnovo, Faber.

Delibes de Castro, G., Fernández Manzano, J., Rodríguez Rodríguez, E. and del Val Recio, J. 2007. Molino Sanchón II: Un salín de época campaniforme en Las Lagunas de Villafáfila (Zamora). In N. E. Morère Molinero (ed.), *Las salinas y la sal de interior en la Historia: Economía, medioambiente y sociedad*, vol. 1. (Actas del Congreso Internacional 6-10 de septiembre de 2006, Sigüenza, Guadalajara): 47-72. Madrid, Dykinson.

Delibes de Castro, G. and del Val Recio, J. 2007-2008. La explotación de la sal al término de la Edad del Cobre en la Meseta central española: ¿fuente de riqueza e instrumento de poder de los jefes Ciempozuelos? *Veleia* 24-25: 791-811.

Escacena Carrasco, J. L., Rodríguez de Zuloaga Montesino and Ladrón de Guevara Sánchez, I. 1996. *Guadalquivir salobre: Elaboración prehistórica de sal marina en las antiguas bocas del río*. Sevilla, Confederación hidrográfica del Guadalquivir.

Fernández Ibáñez, C. 1991. Conservación y restauración de cerámica campaniforme: Trabajos desarrollados en uno de los recipientes del monumento megalítico de As Pontes. *Gallaecia*, 12: 153-169.

Fíguls, A., Bonache, J., Aranda, J., Suñé, J., Vendrell, M., González, J., Mata-Perelló, J. M. and Sanz, J. 2007. Neolithic exploitation of halite at the Vall Salina of Cardona (Catalonia, Spain). In A. Fíguls, and O. Weller (eds.), *1a Trobada internacional d´arqueologia envers l´explotació de la sal a la prehistòria i protohistòria. Cardona, 6-8 de desembre del 2003*: 199-218. Cardona, Institut de Recerques envers la Cultura (Arqueologia Cardonensis I).

Fitzpatrick, A. P. 2011. *The Amesbury Archer and the Boscombe Bowmen. Bell Beaker burials at Boscombe Down, Amesbury, Wiltshire*. Wessex, Wessex Archaeology (Wessex Archaeology Report 27).

Gouletquer, P. and Weller, O. 2015. Techniques of salt making: from China (Yangtze River) to their world context. In R. Brigand and O. Weller (eds.), *Archaeology of Salt: Approaching an Invisible Past*: 13-27. Leiden, Sidestone Press.

Guerra Doce, E. 2016. Salt and Beakers in the third millennium BC. In E. Guerra Doce and C. Liesau von Lettow-Vorbeck (eds.), *Analysis of the Economic Foundations supporting the Social Supremacy of the Beaker Groups. Proceedings of the XVII UISPP World Congress (1-7 September, Burgos, Spain). Volume 6: Session B36*: 95-110. Oxford, Archeopress Archaeology.

Guerra Doce, E. 2017. La sal y el campaniforme en la Península Ibérica: Fuente de riqueza, instrumento de poder ¿y detonante del origen del estilo marítimo?. In V. Gonçalves (coord.), *Sino e taças. Junto ao océano e mais longe: Aspectos da presença campaniforme na Peninsula Ibérica*: 342-353. Lisboa, Universidade de Lisboa.

Guerra Doce, E., Delibes de Castro, G., Abarquero Moras, F. J., del Val Recio, J. and Palomino Lázaro, Á. L. 2011. The Beaker Salt Production Centre of Molino Sanchón II, Zamora, Spain. *Antiquity* 85, 329: 805-818.

Guerra Doce, E., Abarquero Moras, F. J., Delibes de Castro, G., Palomino Lázaro, Á. L. and del Val Recio, J. 2012. Das Projekt ´Salzarchäologie` der Lagunen von Villafáfila (Zamora): Ausgrabungen in den prähistorischen Salzsieden Molino Sanchón II und Santioste. *Madrider Mitteilungen* 53: 85-133.

Guerra Doce, E., Abarquero Moras, F. J., Delibes de Castro, G., Palomino Lázaro, Á. L. and del Val Recio, J. 2015. Bell Beaker pottery as a symbolic marker of property rights: The case of the salt production centre of Molino Sanchón II, Zamora, Spain. In M. P. Prieto Martínez and L. Salanova (eds.), *The Bell Beaker Transition in Europe: Mobility and local evolution during the 3rd millennium BC:* 169-181. Oxford, Oxbow Books.

Guerra Doce, E. and Liesau von Lettow-Vorbeck, C. (eds.) 2016. *Analysis of the Economic Foundations supporting the Social Supremacy of the Beaker Groups. Proceedings of the XVII UISPP World Congress (1-7 September, Burgos, Spain). Volume 6: Session B36*. Oxford, Archeopress Archaeology.

Guerra Doce, E., Abarquero Moras, F. J. and Delibes de Castro, G. 2019. Sal y estrategias de poder en los territorios Ciempozuelos. In G. Delibes, and E. Guerra (eds.), ¡Un brindis por el príncipe!: El vaso campaniforme en el interior de la Península Ibérica (2500-2000 A.C.) 2: 163-180. Madrid, Museo Arqueológico Regional.

Harding, A. 2013. *Salt in Prehistoric Europe*. Leiden, Sidestone Press.

Heyd, V. M. 2007a. When the West meets the East: The Eastern Periphery of the Bell Beaker Phenomenon and its Relation with the Aegean Early Bronze Age. In I. Galanaki, I. Galanakis and H. Thomas (eds.), *Between the Aegean and Baltic Seas: Prehistory across Borders.: Proceedings of the International Conference 'Bronze and Early Iron Age Interconnections and Contemporary Developments between the Aegean and the Region of the Balkan Peninsula, Central and Northern Europe', University of Zagreb/Croatia, 10-14 April 2005*: 91-107. Liège, Université de Liège.

Heyd, V. M. 2007b. Families, Prestige Goods, Warriors and Complex Societies: Beaker Groups of the 3rd Millennium cal BC along the Upper and Middle Danube. *Proceedings of the Prehistoric Society* 73: 321-370.

Jiménez Guijarro, J. 2011. The Beginning of the Salt Exploitation in Spain: Thinking about the Salt Exploitation in the Iberian Peninsula during Prehistoric Times. In M. Alexianu, O. Weller and R. G. Curcă (eds.), *Archaeology and Anthropology of Salt: A Diachronic Approach. Proceedings of the International Colloquium, 1-5 October 2008. 'Al. I. Cuza' University (Iaşi, Romania)*: 123-133. Oxford, Archaeopress, British Archaeological Reports International Series 2198.

Joussaume, R. 1986. La neolithisation du Centre Ouest. In J. P. Demoule and J. Guilaine (eds.), *Le Neolithique de la France. Hommage* à *Gerard Bailloud*: 161-179. Paris, Picard.

Kraikovski, A. V. and Lajus, J. A. 2005. The adventures of Portuguese salt in Russia from the 17th to the 20th century. In I. Amorim (ed.), *I Seminário Internacional sobre o sal português*: 279-285. Porto, Instituto de História Moderna da Universidade do Porto.

Kunst, M. 2001. Invasion? Fashion? Social Rank? Considerations concerning the Bell Beaker phenomenon in Copper Age fortifications of the Iberian Peninsula. In F. Nicolis (ed.), *Bell Beakers today: Pottery, people, culture, symbols in prehistoric Europe. Proceedings of the International Colloquium Riva del Garda (Trento, Italy) 11-16 May* 1998: 81-90. Trento, Provincia Autonoma di Trento.

Malpica Cuello, A., Morère Molinero, N., Fábregas García, A. and Jiménez Guijarro, J. 2011. Land Organisation and Salt Production in Region of the Salado River (Sigüenza, Province of Guadalajara, Spain): Ancient and Medieval Times. Results of the First Campaing 2008. In M. Alexianu, O. Weller and R. G. Curcă (eds.), *Archaeology and Anthropology of Salt: A Diachronic Approach. Proceedings of the International Colloquium, 1-5 October 2008. 'Al. I. Cuza' University (Iaşi, Romania)*: 179-185. Oxford, Archaeopress, British Archaeological Reports International Series 2198.

Martín, A., Juan-Tresserras, J., Martín, J. and Villalba, P. 2007. Indicios de sal en el yacimiento neolítico de Ca l´Oliaire (Berga, Barcelona). In A. Fíguls, and O. Weller (eds.), *1a Trobada internacional d´arqueologia*

envers l´explotació de la sal a la prehistòria i protohistòria. Cardona, 6-8 de desembre del 2003: 175-198. Cardona, Institut de Recerques envers la Cultura (Arqueologia Cardonensis I) .

Martínez Torrecilla, J. M., Plata Montero, A. and Sánchez Zufiaurre, l. 2013. Paisaje Cultural del Valle Salado de Añana. Intervención arqueológica en el extremo sur. *Arkeoikuska* 12: 48-53.

Monah, D. 2012. L'approvisionnement en sel des tribus chalcolithiques sédentaires et des tribus des steppes du Nord de la Mer Noire. In V. Nikolov and K. Bacvarov (eds.), *Salz und Gold: die Rolle des Salzes im prähistorischen Europa: Akten der internationaler Fachtagung (Humboldt-Kolleg) in Provadia, Bulgarien 30 September-4 Oktober 2010 = Salt and Gold: The Role of Salt in Prehistoric Europe. Proceedings of the International Symposium (Humboldt-Kolleg) in Provadia, Bulgaria 30 September-4 October 2010*: 127-142. Provadia-Veliko Tarnovo, Faber.

Monah, D. 2015. Salt Springs: Places for Salt Recrystallization and Ritual Centres for Exchange with Steppe Populations. In M. Alexianu, R. G. Curcă, and V. Cotiugă (eds.), *Salt Effect Second Arheoinvest Symposium: From the ethnoarchaeology to the anthropology of salt 20-21 April 2012, 'Al. I. Cuza' University, Iaşi, Romania*: 111-120. Oxford, Archaeopress, British Archaeological Reports International Series 2760.

Morère Molinero, N. 2007. La sal en el desarrollo histórico de Sigüenza. Los primeros siglos. In N. E. Morère Molinero (ed.), *Las salinas y la sal de interior en la Historia: Economía, medioambiente y sociedad* 1. (Actas del Congreso Internacional 6-10 de septiembre de 2006, Sigüenza, Guadalajara): 3-30. Madrid, Dykinson.

Nikolov, V. 2010. Salt and Gold: Provadia-Solnitsata and the Varna Chalcolithic cemetery. *Archäologisches Korrespondenzblatt* 40, 4: 487-501.

Pérez, J. A. Soler Díaz and J. A. López Padilla (eds.), *Actas del IV Congreso de Neolítico Peninsular. Alicante 27-30 Noviembre 2006. Tomo II*: 356-364. Alicante, Museo Arqueológico de Alicante.

Plata Montero, A. and Martínez Torrecilla. J. M. 2014. Explotación salinera. Excavación en el sector 25. *Arkeoikuska* 13: 55-63.

Riaño, J. F., Rada y Delgado, J. D. de la and García, J. C. 1894. Hallazgo prehistórico en Ciempozuelos. *Boletín de la Real Academia de la Historia* 25: 436-450.

Risch, R., Meller, H., Arz, H. W. and Jung, R. 2015. In H. Meller, H. W. Arz, R. Jung and R. Risch (eds.): *2200 BC – A climatic breakdown as a cause for the collapse of the old world? 7th Archaeological Conference of Central Germany, October 23–26, 2014 in Halle (Saale)* I: 9-23. Halle/Saale, Tagungen des Landesmuseums für Vorgeschichte Halle.

Rocha, L. 2013. A Praia do Forte Novo. Un sítio de produção de sal na costa algarvia? In J. Soares (ed.), *Pré-História das Zonas Húmidas: Paisagens de Sal:* 225-232. Setúbal, Museu de Arqueologia e Etnografia do Distrito de Setúbal (Setúbal Arqueológica 14) .

Saile, T. 2002. Le commerce du sel dans l´Europe centrale préhistorique. In O. Weller (ed.), *Archéologie du Sel: Techniques et sociétés dans la Pré- et Protohistoire européenne. Actes du Colloque 12.2 du XIVe Congrès de UISPP, 4 septembre 2001, Liège et de la Table Ronde du Comité des Salines de France, 18 mai 1998, Paris*: 223-231. Rahden/West, Leidorf.

Saile, T. 2012. Salt in the Neolithic of Central Europe: production and distribution. In V. Nikolov and K. Bacvarov (eds.), *Salz und Gold: die Rolle des Salzes im prähistorischen Europa: Akten der internationaler Fachtagung (Humboldt-Kolleg) in Provadia, Bulgarien 30 September-4 Oktober 2010 = Salt and Gold: The Role of Salt in Prehistoric Europe. Proceedings of the International Symposium (Humboldt-Kolleg) in Provadia, Bulgaria 30 September-4 October 2010*: 225-238. Provadia-Veliko Tarnovo, Faber.

Salanova, L. 2000. *La question du Campaniforme en France et dans les Iles anglo-normandes: productions, chronologie et rôles d´un standard ceramique*. Paris, Société Préhistorique Française.

Salanova, L. 2004. Le rôle de la façade atlantique dans la genèse du Campaniforme en Europe. *Bulletin de la Société Préhistorique Française* 101, 2: 223-226.

Soares, J. 2001. O povoado pré-histórico da Ponta da Passadeira: economia ribeirinha dos IV/III milenios A.C. In *Arqueologia e História Regional da Península de Setúbal*: 101-127. Lisboa, Centro de Estudos Históricos Interdisciplinares da Universidade Aberta.

Soares, J. 2008. Economias anfíbias na costa sudoeste ibérica IV/III milenios BC: O caso da Ponta da Passadeira (Estuário do Tejo). In M. S. Hernández *et al*. IV Congreso del Neolítico Peninsular: 356-364. Alicante, Marq.

Soares, J. 2013a. Sal e conchas na Pré-História portuguesa. O povoado da Ponta da Passadeira (estuário do Tejo). In J. Soares (ed.), *Pré-História das Zonas Húmidas: Paisagens de Sal:* 171-196. Setúbal, Museu de Arqueologia e Etnografia do Distrito de Setúbal.

Soares, J. 2013b. *Transformações sociais durante o III milénio AC no sul de Portugal. O povoado do Porto das Carretas*. Alqueva, EDIA (Empresa de desenvolvimento e Infra-estructuras do Alqueva) (Memórias d´Odiana 2ª série).

Soares, A. M. M. and Ribeiro, M. I. M. 2003. Identificação, análise e datação de um tecido pintado proveniente de um monumento megalítico da necrópole de Belle France (Monchique, Algarve, Portugal). In *Resumo de Actas do V Congresso Ibérico de Arqueometria*: 155-156.

Soares, J. and Tavares da Silva, C. 2013. Economia agro-marítima na Pré-História do estuário do Sado. Novos dados sobre o Neolítico da Comporta. In J. Soares (ed.), *Pré-História das Zonas Húmidas: Paisagens de Sal:* 145-170. Setúbal, Museu de Arqueologia e Etnografia do Distrito de Setúbal (Setúbal Arqueológica 14) .

Tasic, N. 2002. Salt Trade in the Neolithic of Southeast Europe. In O. Weller (ed.), *Archéologie du Sel:*

Techniques et sociétés dans la Pré- et Protohistoire européenne. Actes du Colloque 12.2 du XIVe Congrès de UISPP, 4 septembre 2001, Liège et de la Table Ronde du Comité des Salines de France, 18 mai 1998, Paris: 147-152. Rahden/West., Leidorf (Internationale Archäologie: Arbeitsgemeinschaft, Symposium, Tagung, Kongress 3).

Terán, J. and Morgado, A. 2011. El aprovechamiento prehistórico de sal en la Alta Andalucía: El caso de Fuente Camacho (Loja, Granada). *Cuadernos de Prehistoria y Arqueología de la Universidad de Granada* 21: 221-249.

Valera, A. C. 2014. O conjunto de materiais votivos do contexto funerário do Recinto 1 de Bela Vista 5 (Mombeja, Beja). *Era Monográfica* 2: 41-45.

Valera, A. C. 2017. La sal en el 4º y 3º milenio AC en Portugal: especialización, distribución y consumo. *Cuaternario y Geomorfología* 31, 1-2: 105-121.

Valera, A. C., Tereso, J. P. and Rebuge, J. 2006. O Monte da Quinta 2 (Benavente) e a produção de sal no Neolítico Final/Calcolítico Inicial do estuário do Tejo. In *Actas do 4º Congresso de Arqueologia Peninsular*: 291-305. Faro, Universidade do Algarve.

Valiente Cánovas, S., Ayarzagüena Sanz, M., Moncó García, C. and Carvajal García, D. 2002. Excavación arqueológica en las salinas de Espartinas (Ciempozuelos) y prospecciones en su entorno. *Archaia* 2: 33-45.

Valiente Cánovas, S. 2005-2006. Algunos datos sobre la explotación de sal desde la Prehistoria hasta la Edad Media, en la zona sur de Madrid y en el límite con Toledo. *Boletín de la Asociación Española de Amigos de la Arqueología* 44: 49-62.

Valiente Cánovas, S. and Ramos, F. 2009. Las salinas de Espartinas: Un enclave prehistórico dedicado a la explotación de la sal. In *La explotación histórica de la sal: investigación y puesta en valor. Actas I Congreso Internacional. Salinas de Espartinas. Ciempozuelos*: 167-182. Madrid, Sociedad Española de Historia de la Arqueología.

Weller, O. 2002a. The earliest rock salt exploitation in Europe: a salt mountain in the Spanish Neolithic. *Antiquity* 76: 317-318.

Weller, O. 2002b. Aux origines de l'exploitation du sel en Europe. Vestiges, fonctions et enjeux archéologiques. In O. Weller (ed.), *Archéologie du Sel: Techniques et Sociétés dans la Pré- et Protohistoire européenne. Actes du Colloque 12.2 du XIVe Congrès UISPP, 4 septembre 2001, Liège et de la Table Ronde du Comité des Salines de France, 19 mai 1998, Paris:* 163-175. Rahden/West, Leidorf.

Weller, O. 2015. First salt making in Europe: a global overview from Neolithic times. In R. Brigand and O. Weller (eds.), *Archaeology of Salt: Approaching an Invisible Past*: 67-82. Leiden, Sidestone Press.

Weller, O., Fíguls i Alonso, A. and Grandia, F. 2007. Place et rôle du sel minier de Cardona dans les échanges intercommunautaires du Néolithique Moyen Catalan. In N. E. Morère Molinero (ed.), *Las salinas y la sal de interior en la Historia: Economía, medioambiente y sociedad, vol. 1. (Actas del Congreso Internacional 6-10 de septiembre de 2006, Sigüenza, Guadalajara)*: 99-120. Madrid, Dykinson.

‘Reddish *olle*’ and Production and Use of Salt: an Open Question

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Abstract

In the 1990s some Italian archaeologists brought to the attention of scholars some coastal sites in Latium characterized by large deposits of ceramic materials, mainly consisting of reddish-orange vases (‘*olle rossicce*’). The supposed correspondence between these containers and the vessels from Atlantic sites, so-called *à briquetage,* characterized by similar aspects (colour, relative crudeness of the mineralogical composition and of the manufacturing technique, local production) pushed various authors, despite many doubts, to interpret such sites as probable places for salt production and / or activities related to salt use. After more than two decades unfortunately we have not made good progress in the study of this class of containers. Recent physical-chemical analysis on the findings of a Tuscan site seem to indicate that the reddish coloration would come from the ceramic firing methods, while on the same materials no traces of sodium chloride have been found. If this interpretation is confirmed, and if it could also be extended to finds from other sites, it seriously undermines one of the alleged markers of salt production, namely the particular colour of the ceramic. Hence the need to: 1) analyse, for each site, both the different types of reddish containers and the possible vessels of different colour, and check if the reddish colour appears also in the fine pottery; 2) compare the results obtained from at least two or three sites with reddish pots; 3) verify, through scientific analysis and experimental tests, if the reddish colour may result (also?) from the use of the containers or from special post-depositional processes; 4) carefully study the different types of containers and test their functionality based on ethnographic comparisons and targeted experiments. Meanwhile, we can only make a few hypotheses. The most likely is, in my opinion, the processing and cooking of fish for preservation.

Keywords: reddish pots, coastal sites in Italy, *briquetage*, salt production, processing fish.

The main stages of the research in Italy

The first insights on some sites in Latium

Marco Pacciarelli, in the 1990s (Pacciarelli 1991, 1994), brought to the attention of scholars some sites in Latium, datable to the early Iron Age, with certain characteristic aspects: 1) coastal location; 2) significant deposits of ceramic vessels; 3) great quantities of coarse clay vessels, medium-large and predominantly reddish-brown to orange; 4) the absence of settlement structures and absence or rarity of artefacts and remains typical of inhabited sites (tableware, lithic industry, instruments linked to the preparation of food and crafts, faunal remains etc.); 5) the presence at some sites of particular structures, such as pits and tanks. These elements promoted the interpretation of these coastal sites as likely sites of salt production and / or activities related to the salt use (Pacciarelli 1991: 170-171).

However, in 1999 and then in 2001 (Pacciarelli, 1999: 60-61; 2001: 175-176) Pacciarelli tried to argue this hypothesis for some contexts Lazio and for the site of Isola di Coltano near Pisa (see below), but only as part of broader issues and then without facing the specific problems related to the salt production and use. In 1999 Pacciarelli used for the first time, if I am not mistaken, the expression ‘*giacimenti a olle d’impasto rossicce*’ (‘deposits of reddish impasto pots’), which would then be taken up by various authors, and related these pots to containers found in Atlantic *briquetage* sites and characterized by some similar aspects (colour, relative crudeness of the mineralogical composition and of the manufacturing technique, local production).

In 1998 Belardelli and Pascucci (1998: fig. 1B) suggested six sites (Torre Valdaliga, La Mattonara, Malpasso, Marangone, Guardiole and Torre Chiaruccia) potentially connected with such activities. Beyond the judgment on the individual sites, it should be noted that from these sites the excavators recovered artefacts belonging to the Middle Bronze (BM) and Iron Age, but not the to the Late (BR) and Final Bronze Age (BF); this discrepancy may perhaps depend on the randomness and rarity of the finds, but it is certain that we are dealing with different situations, because in two sites there are remains of dwellings and in others not.

However, only a preliminary study of the pots from Latium was carried out and the authors did not discuss their possible function or rather possible functions, since these vessels do not form in any case a homogeneous typological category. Moreover, the sites in Latium presented medium to large vessels, with more or less rounded profile, but not the typical shapes (conical and small) of *moules à sel*. No remains of specific installations, such as grills, had been recovered. Finally, the authors had not taken into account the geo-climatic conditions of the Middle-Tyrrhenian area, very different from those of the Atlantic sites and generally suitable for natural evaporation of sea water.

The site of Coltano (Pisa)

In 1997 Marinella Pasquinucci and Simonetta Menchelli, in a preliminary study of the material found at Isola di Coltano near Pisa, on the basis of the large amount of *impasto* ware (about 10,000 pieces), and the prevalence of medium to large vessels, coloured from red to orange, thought it 'probable that this was an area specializing in the redistribution of pottery, whose production centre was to be in the vicinity', but 'perhaps also in other economic initiatives (salt production / trade?)' (Pasquinucci and Menchelli 1997: 50). Subsequently the dissertation of Linda Secoli (Secoli 2000) and two papers (Di Fraia and Secoli 2000; 2002) pointed more clearly to the special features of the site that can be connected to the production and use of sea salt. In particular, the nature of the site, with coastal dunes subject to cyclical marine ingressions, favoured the formation of natural saline pools, with natural evaporation phenomena attested by the discovery of several bivalve molluscs dead on site. The abundance of ceramic materials and the remains of hearths contrasted with the absence of traces of dwellings and artefacts typical of the activities carried out in inhabited settlements. Among the ceramic remains, consisting only of pottery, coarse vessels constitute about 70%, based on the minimum number of diagnostic elements; semi-fine ceramics, with a partially purified clay and more refined surfaces, represent approximately 20% and the fine wares about 10%. However, there is little typological difference between the coarse ceramic vessels and the semi-fine ones; these are mainly almost cylindrical or truncated-conical, often provided with plastic cords. The prevailing colours of the surfaces range from red to orange, and only about 30% of the fine ceramics have a colour between grey and blackish.[1] The fine ceramics allow us to date the frequentations of Coltano roughly from 1500 to 1000 BC. Two important features are the high rate of fragmentation and the typological continuity of the medium to large vessels in the long period of time indicated.

The low number of handles and loops suggests that many containers that lacked them were not subject to frequent transfers, but used for repeated filling and emptying in almost permanent installations.

The importance of the Coltano site was increased by the fact that, compared to the Latium sites suggested for possible salt production in the early Iron Age, this production could now be backdated by at least 500 years on the basis of the ceramic typology.[2] The only radiometric dating is rather suspect. In fact, a carbon sample coming from the US 17 has been dated to 3,500 ± 90 years BP (Pasquinucci and Menchelli 1997: 49), too high compared to the archaeological dating, especially when you consider that the US 17 is the most recent layer. Thus, we must suppose either some form of contamination of the sample or its intrusion from the oldest levels, a phenomenon made possible by the long series of erosions and subsequent vertical movement, which also affected some artefacts.

Today, even to partially correct some assessments made in my previous works, I am inclined to the view that in Coltano salt was produced primarily by natural evaporation, and that the medium to large containers were used mainly for fish processing (cooking, salting and / or fermentation) and perhaps in part just for the storage of salt. Of course nor can it be excluded that some materials come from furnace dumps after production of pottery, which according to some analysis of the mineralogical composition seems to have been carried out on site (Di Fraia 2006: 1644).

The Picarreta 13 site (Neptune, Rome)

On the Latium coast between Nettuno and Torre Astura, in a site excavated in 2001 and 2002 and named P 13 (Attema et al 2003; Attema and Alessandri 2012), about 45,000 ceramic fragments were recovered, of which over 97% are of protohistorical age. The majority belong to large or medium sized containers, of conical truncated shape and cylinder-ovoid (fig. 2. 4, 6, 8-10), while tableware is scarce (fig. 2. 5,7); the diagnostic types are attributed to the late Bronze and early Iron Age. The medium to large vessels have been interpreted as containers for the production of salt cakes. But we must emphasize the remarkable dimensional variability of such vessels: the diameter at the rim varies from less than 30 cm (the smallest ones seem under 20 cm) to over 50 cm. This variability does not agree with a standardized production, as we would expect in the case of producing salt cakes. Some fragments of jars or *dolia* retain traces on the inner surface of 'salt colours' (i.e. colours produced by contact with salt water at relatively high temperatures), ranging from white to pink to grey to lavender. Many pieces of tufa, often burned and with flat, perhaps shaped, surfaces, have been interpreted as possible supports for the containers during boiling brine.

La Mattonara (Civitavecchia, Rome)

It is a coastal site, already tested in the twentieth century and subsequently investigated in 2005, in two distinct areas (Belardelli *et al*. 2008). In area A, in which the deposit was more consistent and not mixed up, as it was in area B, over an area of 15 m^2, a deposit 100 cm

[1] The percentages of the mixtures and those of the colours are an average of the presences calculated in all the US, which, however, present considerable percentage differences between them. However the overall statistic was considered more significant, since the site has undergone several episodes of flooding, marine ingressions and erosions that have altered the consistency of the various anthropogenic deposits.

[2] Menchelli in 2002 (Pasquinucci and Menchelli 2002) amended its previous (Pasquinucci and Menchelli 1997) dating of archaeological materials (Early Bronze- initial Middle Bronze), but, despite citing Di Fraia and Secoli 2002, she proposed a still wrong date (1600 -1200 a. C.).

thick has been excavated, with alternating ashy levels with strong component carbonaceous and sandy/ clay matrix levels with thousands of *impasto* pottery fragments. 'Some of these levels show a lenticular shape and a limited surface, others are present over the entire area; the whole succession follows however a fan pattern' (Belardelli *et al*. 2008: 354).

Excavations have yielded a large amount of pots, especially cylinder-ovoid or globular-ovoid with cords, but also vessels with neck and some other shapes; many fragments are 'over-fired'. Unfortunately, while in the materials from previous excavations it had been estimated that the jars constitute 60% of the pottery remains, for the materials of 2005 a precise percentage is not provided, but we have only an indication of 'superabundance of the *olle* compared to the other forms'. However the fine *impasto* ceramics are well represented: mostly biconical ('Villanovan') and small vessels of closed form. The only stone artefacts are an arrowhead and some hammerstones and sharpeners or smoothing tools. Unfortunately, the interpretation proposed by the authors is quite confused and mostly contradictory. In fact, they state: 'About the functional interpretation of the investigated site ... we think we can exclude a residential nature in favour of the hypothesis of a functional installation linked to specialized productive activities.' Now first of all we must point out that the investigated site is (for area A), according to the same authors, 'a collection point for the waste of the functional and productive activity' (p. 361) and then only indirectly one can assume the presence of particular production installations. Secondly, one can not absolutely rule out the presence of a nearby settlement core; indeed this presence is fully plausible, given the high percentage of fire and table pots other than jars. Based on these data, the following statement seems totally incongruous: '... it could be argued an activity related to the extraction of sea salt by burning.' To this generic statement is attached no explanation about the use of the containers necessary for the treatment of salt solutions. Indeed, a little further on, it is claimed that the jars were 'broken after fulfilling elsewhere their task as containers for cooking fish and salt mixtures and in turn already burned because of the likely continuous reuse in various cooking. The waste material of the production process was regularly and thoroughly covered with sand and embers / ashes ...' Therefore the containers would have served only for cooking fish?

Also according to the authors 'The deposit was also likely to be often 'rinsed' by the waves, a phenomenon ... evidenced by the white and yellow scabs of salt that in some cases covered the area in extension' (Belardelli *et al*. 2008: 360-361).

Later, about the *olle* and their 'systematic breaking', an assumption is made about 'the proximity of the seafood processing workshop and presumably also of another workshop for manufacturing the pots', but no reference is made to any use of pots for salt production. Even the conclusions state that area A 'seems to be primarily a huge landfill of potsherds; the site was probably inhabited by people who, in different areas, worked to supply the marine product that was processed in situ, to manufacture vessels, to prepare large fires to consolidate the contents (organic?) of the vessels, and to extract the contents itself by breaking the pots ...'. Even in this passage two points are not clear. First of all, I do not see why, after speaking explicitly about conserved fish and seafood processing, one should question the organic content of the jars. Secondly, the hypothesis of an intentional breaking of the pots to extract their contents appears in contradiction to the previous statement that there would be a likely continuous reuse in various cooking sessions.

Because salt was necessary to preserve fish (Carannante 2011), it is likely that in the coastal sites of Mattonara and Marangone, like Coltano and Nettuno, the salt was produced by evaporation and locally used for fish processing.

Even for the site of Pineta del Casone, in Baratti Bay (Grosseto), interpreted by Giorgio Baratti (Baratti 2010, 2015) as a place for salt cake production, we must formulate, in my opinion, the same criticism expressed for the sites in Latium.

The Puntone Nuovo site at Scarlino (Grosseto)

A recent contribution (Aranguren *et al*. 2014) has highlighted the main features of Puntone Nuovo - Campo da Gioco at Scarlino. This site primarily includes 'three rectangular combustion structures, of the same type identified already at Scarlino at another site (Portiglioni) in direct connection with a series of tanks used for the evaporation of sea water, and therefore presumably in relation to the salt production by boiling brine, as in European *briquetage* sites... In connection with the structures of Puntone Nuovo... thick dump layers ... composed almost exclusively by fragments of reddish *impasto* pots. Therefore, we must take into account the hypothesis that combustion structures of this type were used for a similar model of production, in which the pots could play the role of brine containers.'

While I postpone to the concluding discussion the examination of that hypothesis, here I would like to highlight an aspect emerging from the physical-chemical analyses conducted on the ceramics from Puntone Nuovo, namely the statement that 'The colour of the ceramics is predominantly reddish due to firing in an oxidizing atmosphere'. If this interpretation is confirmed, it seriously undermines one of the alleged indicators of salt production, that is the particular colour of the ceramic, which instead, in the case of

Scarlino, would have nothing to do with the contents. We will, in any case, return to this issue later.

Torre S. Marco at Agropoli (Salerno)

In Campania the Torre S. Marco site (Agropoli) yielded some evidence which has been interpreted (Albore Livadie *et al.* 2010) as the remains of an installation for salt production by *briquetage*. The ceramic remains are formed almost entirely (98% of the fragments) 'by barrel-shaped or truncated-conical corded *olle,* while the fine ceramics are in a low percentage'. They also identified '... four combustion structures (simple semicircular section pits) ... All five [sic] structures are lined by a whitish concretion, probably originated by the decay of the stones that coated and delimited them. ... Beside the hearths, there are some post holes that could, however, be related to more recent times and in the middle two large storage pits... Not far from the hearths there is ... [a] heap of a large amount of potsherds... [it] suggests a real dump of material formed probably after breaking the pots for extracting the salt.'

None of these characteristics provides circumstantial evidence of salt production. Furthermore, the pots are generally enriched with cords, some of which are quite elaborate, and are often provided with handles. This is in sharp contrast with the hypothesis of one-use disposable vessels. The prevailing colour of the pots is red-yellowish, but there are also some grey pots and a lot of shades of brown. Conversely, the red-yellowish colour is also recorded in some fine ceramic fragments and in a *dolium*.

About the structures, there is a certain terminological confusion between 'hearths', 'combustion structures' and 'pits', which, combined with insufficiently clear drawings, makes it impossible to reach an understanding of the described structures and then to advance a reliable interpretation.

The case of the Castelliere of Elleri (Trieste).

Emanuela Montagnari Kokelj in 2005 thought she could recognize '*éléments de briquetage* in high number in the *castelliere* of Elleri'. In 2006 Cassola Guida and Montagnari Kokelj published a contribution that, on the basis of old excavations and publications, reinterpreted the record of Elleri believing that they could recognize, among the materials from the excavations carried out in the 40s and 50s and published by Benedetto Lonza (1983), 'moulds' for the production of salt cakes, perforated cooking plates and hourglass supports, all in a scenario of *briquetage*. The Elleri site was linked with the neighbouring one of Stramare of Muggia, a seaside terrace that, according to the authors, could have been, already 'in the context of the Middle-Late Bronze Age' a 'salt production area' (Cassola Guida and Montagnari Kokelj 2006: 330-331).

Regarding Elleri, in some of my works, and also in the presentation for this conference, I limited myself to mention this hypothesis, albeit with some doubts. In particular, it seemed to me problematic that the pottery remains of the alleged *briquetage*, moreover in an unknown, but however seemingly modest number, had been found on top of a fort, at an altitude of over 240 m and at a certain distance from the sea; in this context, transportation of seawater or brine and of timber needed for fuel would have constituted a significant and unlikely additional workload. Therefore I decided to submit to a critical review the Elleri record and the related interpretation.

It should first be noted that the material published by Lonza lacks precise stratigraphic provenance. Furthermore, the operation, made by Lonza, to group together a large amount of vessels only on the basis of the type of *impasto* and of the manufacturing technique and to distinguish, within these groups, a series of types on generic and not formalized bases, led to the creation of entirely fictitious categories. In other words, we find associated vessels that may belong to different periods and vice versa. In particular, the truncated-conical forms are among the most trivial and common ones throughout the Bronze Age and the creation of a specific category is entirely artificial. Lonza himself, about the group or 'type' *c*, i.e. the one to which belong among other the alleged moulds for *briquetage*, observes: 'The same type of *impasto* belongs, but not exclusively, also to vessels that as for the shape have nothing in common with the mentioned category' (Lonza 1983: 23).

Another doubt concerns the supposed distinction between types with or without loops; it is possible that the pieces described as bottoms belong to vessels provided with some handles separately illustrated, since it is unlikely that there are no loops or handles in coarse ceramic. And yet, it also seems unlikely that there are no (coarse) rims that are connected, or at least are compatible, with the mentioned bottoms. The attention to these and other critical issues would have to dictate caution in interpretation. Cassola Guida and Montagnari Kokelj (2006: 330), with regard to the excavations of Lonza and layer 20 of the 1985-92 excavations, refer to vases 'truncated-conical variously expanded, with no loops or handles, flat bottom heel-shaped or on low ring foot, or, more rarely, sharply tapered with beveled and almost pointed bottom (fig. 2.1).' Fig. 2.1 shows very open conical rims and a number of bottoms with the beginning of a truncated cone wall, but no complete profile that identifies a real 'type'. On the other hand, the fragments illustrated are so different (for the profile of the top and the bottom, for diameter and thickness) that they must necessarily be attributed to many different types. In particular, the first fragment in the top left (Lonza, 1981 pl. 39, 6) could belong to the support of an hourglass; the tiny fragment of the bottom (diameter about 1.8 cm; Lonza pl. 40, 1)

could refer to a miniaturist and other pieces could be covers, as Lonza himself suggested (1981: 58-59). There is therefore no reason why the authors can say that these vessels 'are the only type of vessel attested'.

A little further on it is stated that 'the conical containers seem to be moulds to produce salt cakes in rather standardized shapes', but the precise shape of the containers is not defined, nor is any technical drawing of the finds recovered in the 1980s and 90s provided. From a successive hint (maximum diameter between 20 and 25 cm.) it seems that they correspond to those called 'cups' by Lonza, but in fig. 2.1, as we said, this (alleged) category is flanked (on the right) by a series of finds classified by Lonza among the generic 'bottoms', very different from each other both in their profile and size. So, we do not understand if in the opinion of the authors all the pieces graphically represented are 'conical containers ... to produce salt cakes.'

However in note 15 the authors refer to all containers considered by Lonza as for 'daily use', the characteristics of which 'correspond exactly to those outlined in Weller 1996, p. 283'. But in this case not only would we not have a group of standardized vessels, but it would be really impossible to connect all them to the alleged functional aim. If instead the authors wanted to refer only to conical shapes with very narrow bottoms, Lonza (1981: 58) states that these are 'few vessels' and thus the hypothesis of their significant role in any production sector would be invalidated. In addition, the wall thickness (min 3, max 6 mm) is too thin to be able to sustain the impact of the fire to which a salt mould would be subjected. Indeed, the comparative elements illustrated in fig. 3 (Cassola Guida and Montagnari Kokelj 2006) from Halle and other Western European sites, all are very small (between 19 and 8 cm in height) and with a much more robust structure. Even the most recent contribution on Elleri (Montagnari Kokelj *et al.* 2015) has not provided any further clarification, either on the morphology of the types in question or on their statistical incidence. Finally, we must observe that the 'common' containers of Lonza (1981: 56) are all red; even if this chromatic homogeneity depends on an association arbitrarily created by Lonza; however, once again the problem is to understand the cause of this coloration, common to very different types.

If we now take into account the few remains of perforated fire plates, we must first note that the holes of the best preserved pieces are quite small and irregular (max. diam. of 2 to 3.5 cm), so only pots with a bottom diameter no more than 3 cm could be inserted, if only partially. But in this regard the paper lacks any indication of wear. Finally the holes in the plate are so close together (3-4 cm) that virtually only very small vessels could fill all of them. For all these reasons it is preferable to interpret these remains as a normal perforated plate belonging to a stove.

Finally, at least some of the alleged supports (Cassola Guide and Montagnari Kokelj 2006: 330, fig. 2.3) can be interpreted as large spools connected to textile activities.

Ultimately, on the basis of the scarce data published to date, we know that:

1. the Castelliere di Elleri was a dwelling site from BM to BF (see abundance of fire and table wares, even fine wares, fauna, spindle whorls etc.);
2. the small number of vessels related, according to Montagnari Kokelj and colleagues, to salt production is the result of an extrapolation obtained by selecting some pieces from all the materials of Lonza (which already originally were formed into arbitrary groupings), without any reference to their provenance, either horizontally (which sector) or stratigraphic (which layer);
3. finally, as we have seen, none of these pieces has the typical features of moulds from *briquetage* sites.

The supposed link with the Stramare site is refuted by a recent review of the materials from this site, among which only three findings seem attributable to the Bronze Age and a few dozens to the Iron Age (Montagnari Kokelj *et al.* 2015: 6). Because in 2006 (p. 330) it was stated about Elleri that 'layer 20 identified in the excavations from 1985 to 1992', where the vessels in question 'are the only type of evidenced container', is dated to the 'Middle-Recent Bronze Age', the materials of the two sites are not chronologically overlapping and then we cannot establish any functional link between them, as previously supposed.

Despite these contradictions, in 2015 Montagnari Kokelj *et al.* have repeated the same interpretation (even literally quoting some parts of the 2006 text), without an optical revision of the old Lonza materials and without any documentation of the materials coming from the 1985-1992 excavations and the successive ones. In this publication it is stated inter alia that 'direct indicators - *briquetage* elements - seem to appear only with the Bronze Age' (p. 7), while 'indirect indicators' seem to be reduced to the 'thesis that salt had an important role in the settlement dynamics of the Karst both in late prehistory and in protohistory'. Moreover, the claim is specious that there would be the presence of direct and indirect indicators in the same area, 'even if only partially overlapping in time', because this overlapping is entirely absent on the basis of the data provided.

Unfortunately, various scholars have fallen into error, in which for some time I was enmeshed too, to consider as proven the hypothesis of a salt production in Castelliere of Elleri. In particular, Cassen and Weller (2013: 271 and fig. 6) think they see a similarity between some vessels

from Champ Durand (Ard and Weller 2012), small (12-13 cm), coarse and very standardized, interpreted as *moules à sel*, and the profiles of two pottery fragments from Elleri. This comparison, however, is impossible, first because no serious typological comparison can be proposed with the Elleri vessels, of which we do not possess any complete specimen, and therefore one cannot speak of an 'identical form still used in the coastal salt production site dated to the Final Bronze Age at the Castelliere di Elleri. Furthermore, the Elleri specimens have a much more flared shape and a smaller thickness than those of Champ Durand. However, even supposing that the two fragments of Elleri belonged to truncated-conical pots, the truncated-conical shape is one of the most widespread in the different ages and can fulfil multiple functions; therefore, in order to associate the truncated-conical vessels with *briquetage*, we need other inherent features of the containers, in addition to specific elements of the context. Finally, the fragments of Elleri taken for comparison are only two, too few to support a major production, especially as the same Cassen and Weller extend the comparison to the Portuguese specimens of Monte da Quinta 2, which are estimated in the order of thousands (Valera *et al.* 2006: 296).

Unfortunately, this is not the only misstep of Cassen and Weller, who in the same work (2013: 268-269) reproduce an extravagant interpretation (already presented in Cassen *et al.* 2004) of some structures of the Neolithic Apulian site of Masseria Passo di Corvo, whose tanks and trenches are considered parts of a salt production system. The matter is all the more serious because the authors do not even consider the objections I formulated several years ago (Di Fraia 2008: 294-296) and that they should well know, because my contribution was published in France.

What do we really know about the so-called 'reddish pots'?

In archaeology it is often necessary to create categories of artefacts united by certain fundamental traits. Of course, the crucial problem is to identify a number of specific elements (technological, morphological, dimensional, functional), allowing us to properly delineate each category and distinguish it from all others. Unfortunately for the so-called 'reddish pots' a proper typological-functional classification has never been carried out, either when that denomination was introduced or later.

So, the '*olle rossicce*' denomination is still used to indicate a fictitious category, which does not have identifiable boundaries; essentially any reddish container medium-large is included in this huge grouping. But in reality neither the noun nor the adjective hold up to the weight of a serious criticism. It is not correct to use indiscriminately the term '*olle*' to indicate containers well-differentiated in morphology, capacity and accessory elements.

Which explanation for the reddish colour?

As for the colour, it must first be noted that not in every sites considered are all the containers in question reddish and, especially in some sites, also other vessel types are red. For Coltano, for example, the reddish colour is also present in most (70%) of the fine vessels and this indicates that the cause of this coloration cannot be linked (exclusively or primarily) to the production or the intense use of salt, while conversely the fine grey-blackish ceramic, subject to the same taphonomic conditions, suggests that to simply exist in a salty environment is not enough to cause a reddish colour.

In Attema and Alessandri 2012 and Tol *et al.* 2012 the authors still insist on the ceramic colour to support the *briquetage* hypothesis, but they limit themselves to merely repeating what was written by Attema, Haas and Niboer in 2003, namely that some sherds from Site P 13 have traces of 'salt colours', which would be indicators of the presence of salt. But as these tracks were recorded on only a few fragments and the authors claim that the vessels were broken intentionally because salt clung too tenaciously to the walls, should we infer that the other fragments (nearly all) belong to vessels that were not used for salt production? Or it is conceivable that post-depositional phenomena have eliminated all traces of salt? However, it amazes that the authors do not grasp how this observation comes into contradiction with the cliché of the '*olle rossicce*'. In other words, one of two things is true: either the generic reddish to orange colour of the pots is sufficient evidence to imply *briquetage* processing, or not, and then we have to look for other clues. Even in this latter case, however, it is still necessary to explain the cause of the prevailing reddish colour.

In this regard it would be important to understand whether the presence of salt colouring is compatible with the use of such containers for other aims (in particular cooking fish; see below).

Some recent experiments (Tencariu *et al.* 2015) can offer some useful insights. Because in their first attempt, in which the brine was in direct contact with ceramics, 'breaking the vessels also led to the salt cake breaking, its parts remaining attached to the pieces of the briquetage', Tencariu and colleagues made a second experiment, creating an insulating layer inside the moulds, using pork fat or leaves of *Arctium lappa* and *Rumex patientia*. 'The insulating layer proved to be the solution to easily separating the salt block from the vessel' (p. 124). 'The briquetage sherds, by exposure to high temperatures in the presence of oxygen at the exterior and carbon from insulating layers on the inside, changed their original appearance. Thus, they acquired a reddish hue (light red to reddish brown and

2.5YR6 / 6e2.5YR5 / 4) on the outside and a dark colour on the inside (2.5YR / 1), features also encountered on the prehistoric briquetage fragments' (p. 125).

These colours are generally not found in the Italian '*olle rossicce*', which at least at some sites (but not all) have a fairly uniform colour, from reddish brown to orange, both on the inner and outer surfaces, and in the walls (however, even for the latter feature there are exceptions, e.g. in Coltano). In addition, the experimental moulds used by Tencariu and colleagues are exclusively conical and very small, with a capacity of 450-550 cm^3, quite different from that of Italian jars.

Since, as mentioned before, the analysis presented in Aranguren *et al.* 2014 shows that the red colour of Scarlino specimens derived from cooking vessels in an oxidizing atmosphere, one must conclude that this colour is not indicative of the kind of utilization, especially as in the same materials no traces of sodium chloride have been found. If this were true also for similar sites, the reddish pots deposits would be associated, on this basis, only with a similar manufacturing process and not by specific production activities carried out using these containers. This simple observation would have deserved a wide discussion, while in the work in question that gross inconsistency is not even detected.

Finally, it should be explained why this feature unites especially particular coastal sites.

Discussion and deontological issues

The interpretation proposed for the first time by Pacciarelli[3] for the 'giacimenti a olle d'impasto rossicce' was built through a series of very questionable inferences, which are as follows:

1. the *briquetage* sites recorded on the Atlantic coasts for the salt production contain many reddish ceramic vessels and large amounts of ash and other combustion traces;
2. some coastal sites in Lazio are rich in reddish pots and sometimes have some structures (ditches, channels, hearths etc.) comparable to those found in *briquetage* sites;
3. thus the Italian deposits with reddish pots must be interpreted basically as 'industrial' systems for the salt production.

The claim to have developed an 'interpretation model' for the 'reddish pots deposits' (Pacciarelli in Aranguren *et al.* 2014: 229, note 60) conflicts with the fact that Pacciarelli indeed has never discussed in depth the issues related to the interpretation of these pots, which still remains difficult (see below). Various authors still recently (Aranguren *et al.* 2014; Aranguren and Cinquegrana 2015; Montagnari Kokelj *et al.* 2015; Baratti 2015) have again proposed, in a very generic way, to connect reddish pots and *briquetage*, totally ignoring the criticism expressed against that interpretation. I believe on the contrary that this connection is unsustainable and therefore the use of the term *briquetage* is misleading (Di Fraia 2008: 295-296). Moreover, the scholars themselves, mostly French, who have studied in depth the real systems of *briquetage*, warn against interpreting any *briquetage* structure as an unquestionable system of sodium chloride production.

As regards the types of vessels in question:

1. In the so-called 'reddish pots deposits', the pots are not the only type of vessel in coarse clay; also it is not always specified how the percentage of pots was obtained, compared to other *impasto* containers.
2. In these sites there are various types of vessels of medium to large size, hardly attributable to the same function; the great variety of sizes and capabilities has not so far been discussed, as well as the open and closed forms, two aspects which themselves seem to advise against any univocal interpretation; moreover, no specific explanation about such a variety has been advanced.
3. With regard to the colour, so far no one, to my knowledge, has conducted studies to determine characteristics, distribution and statistical incidence of the different colours of ceramics

[3] For reasons of scientific ethics I have to deal with a matter in which, in spite of myself, I was involved, because my intellectual honesty has been called into doubt. In the contribution of Aranguren *et al* 2014, in note 60, p. 229, Marco Pacciarelli suggested that I deliberately excluded (in Di Fraia 2006) some of his works. That note is the substantial repetition of a previous note (Pacciarelli 2010, note 37, p. 380), where among other things it was stated that 'in Pacciarelli 1999c ... was interpreted for the first time the Paduli [sic] di Coltano site in this key ', claim which is not true, since the salt production at Isola di Coltano was proposed for the first time by Pasquinucci and Menchelli (1997: 50). Moreover in the first article in which I have dealt with salt in prehistory (Di Fraia and Secoli 2000) with co-author we have cited the Pacciarelli 1991 work, while in the second article (Di Fraia and Secoli 2002) we have cited his works of 1991 and 1994. In my subsequent papers on the subject, I tried to investigate a number of issues which Pacciarelli never approached, and so I had no reason to mention him. In the face of his strange obstinacy against me, as far as I know Pacciarelli has not expressed any similar observation on deficiencies or 'deliberate omissions', to use his terminology, against other authors, such e.g. Harding 2013, which does not cite any Pacciarelli work, but cites Di Fraia 2011 and Di Fraia and Secoli 2002; or Attema *et al.* 2003, where about Coltano only Pasquinucci and Menchelli 1999 and 2002 are cited. The most paradoxical aspect of this story is the fact that Pacciarelli (and with him the co-authors of Aranguren *et al.* 2014) incredibly ignores my most recent works on this issue (Di Fraia 2008, 2010 and 2011), all of which are also available online in the site academia.edu, and so he do not even considers a number of important issues raised by me. Finally, in my 2006 contribution (Di Fraia 2006) I did not intend at all to "present a general picture of the studies relating to coastal sites aimed at the production of salt" (as Pacciarelli claims in Aranguren et al 2014: 229, note 60), but I addressed a spectrum of basic issues and only briefly mentioned the Lazio sites, while underlining their interpretative difficulties. And in that case I did not adopt the "connected interpretation" (ibidem), on the contrary I contested the univocal interpretation of the reddish vases.

at the individual sites, or comparisons between different sites.
4. For various deposits we do not know whether the fine pottery is also reddish, but we know that in some sites at least part of that pottery has this colour.
5. In most cases we do not know the cause of the reddish colour, which may have no relationship to the contents.
6. At least in one case (Scarlino: Aranguren *et al.* 2014) it seems established that the reddish colour derives from the firing method for producing the vessels.
7. In some cases a part of the ceramic fragments comes from discharges of furnaces for the pottery production. And of course this explanation can be virtually extended to other sites.

However, it must be repeated that in the Medium-Tyrrhenian coastal sites, and even more in southern Italy, the most economical way of salt production was natural evaporation (Di Fraia 2008: 295) and certainly not *briquetage*.

Were the pots intentionally broken?

According to an assumption accepted by various scholars without adequate checks, the pots would be used to reduce the salt in cakes and destroyed after each boiling cycle to extract its contents. But first of all, if this was their prevalent use, the conical shape would be privileged, as for the moulds of real *briquetage*, which moreover are never pots but much smaller vessels, conical or truncated-conical. Secondly, it is unlikely that one wished to obtain cakes corresponding in volume to the entire capacity of the containers, since these blocks would be too bulky and heavy and therefore difficult to transport. It would be theoretically easier, and would not result in the breaking of the vessels, to produce cakes corresponding to a part of the vessels' capacity, because that would have favoured their extraction. But even this hypothesis seems unlikely, because we do not understand why one should produce relatively large vessels to obtain cakes much smaller than the total capacity of the containers.

Within the hypothesis that links reddish pots and *briquetage*, the most paradoxical aspect is the fact that in Italy the typical *briquetage* moulds are absent, while conversely the *sites à briquetage* on the Atlantic coast lack the reddish pots!

The assumption that the containers used for *briquetage* were systematically broken for the extraction of the salt cakes has been advanced only for the mostly conical and small moulds (10-20 cm height, 10-15 cm rim diameter, 5-7 cm base diameter). But there is no clear archaeological evidence of this practice, that is that the moulds were disposable, even if a recent testing (Tencariu *et al.* 2016) offers some clues in this regard. Still less is there any evidence that the Italian reddish pots were intentionally broken after one boiling, indeed in some cases (see below the case of Mattonara) we have clues that go in the opposite direction.

The hypothesis of fish processing and some concluding remarks

As I mentioned above, an explanation of the presence of many medium and large containers in allegedly specialized coastal sites could be linked to fish processing for preservation. Some authors contest that interpretation and propose a scenario of *briquetage* for various sites of the Lazio, with generic and unconvincing arguments, while they summarily dismiss the hypothesis of fish processing. In particular, for the Marangone site, Trucco and colleagues (2002) argue that this hypothesis 'would not justify the use of the pots as disposable empties'.

First we must note that the expression 'disposable empty' seems to imply that each container was broken after a single use for cooking fish, an unlikely idea that no one has ever claimed. It is however evident that the repeated use, up to structural failure, of a large number of jars postulates an intensive processing of fish products, but this is perfectly compatible with the prehistoric conditions, when the sea was much more rich in fish. In fact, the fish resources, given their perishable nature, often needed, in the case of very fruitful fishing, the processing of large amounts of fish to ensure their conservation and exchange. The smaller fish were particularly suitable to be turned into paste or fermented sauces, with several potential advantages: 1) the workers avoided all forms of waste; 2) they guaranteed excellent preservation in the long term; 3) they obtained a very cheap product, especially if one considers that probably the transformation procedure was fairly simple; maybe a single cooking would have easily allowed the reduction of the fish into small pieces or mush and possibly allowing for fermentation as paste in large containers. Storage for salting / drying probably would have required more time and manpower. In Thailand, today fish are still salted and sun-dried or fermented in jars with salt (with the addition of rice to favour the fermentation); this second method ensures a longer preservation (Yankowski *et al.* 2015).

At Mattonara many pots show traces of repeated firings, which corresponds perfectly to intensive fish processing. Finally, I observe that the great variability of diameters and capacity of the containers in question does not seem compatible with a generally very standardized function, such as salt production. On the contrary this feature is easily explained in the context of processing and conservation of fish, which obviously could vary widely in the amount of the raw material

(the fish caught), in its types (large and small fish, of different quality levels), and then in the different needs of cooking and preserving. Among other things, we must also consider the possibility that from the fish one could obtain not only foodstuffs, from the most valuable (flesh) to various sauces, but also other products, such as e.g. fish glue.

In conclusion, at this point of the research I believe it is necessary to:

1. analyse, for each site, both the different types of containers of reddish colour and possible specimens of different colour, checking in particular whether the reddish colour also occurs in the fine tableware;
2. compare the results obtained from at least two or three reddish pots sites dated to the same period;
3. ensure, through scientific analysis and experimental tests, whether the reddish colour may arise (also?) from the use of the containers or from particular post-depositional processes;
4. carefully study the different types of containers and test their functionality based on ethnographic comparisons and targeted experiments.

References

Albore Livadie, C., Arcuri, F., Scarano, G. and Verrone, F. 2010. Torre S. Marco: un insediamento costiero del Bronzo finale ad Agropoli (SA), *Annali Università degli Studi Suor Orsola Benincasa di Napoli*: 7-74.

Aranguren, B., Cinquegrana, M. R., De Bonis, A., Guarino, V., Morra, V. and Pacciarelli, M. 2014. Le strutture e lo scarico di olle del Puntone Nuovo di Scarlino (GR) e i siti costieri specializzati della protostoria mediotirrenica. *Rivista di Scienze Preistoriche* LXIV: 227-258.

Ard, V. and Weller, O. 2012. Les vases de 'type Champ-Durand': témoins d'une exploitation du sel au Néolithique récent dans le Marais poitevin, In R. Joussaume (ed.) *L'enceinte néolithique de Champ-Durand à Nieul-sur-l'Autise (Vendée)*: 319-343. Chauvigny: Association des Publications Chauvinoises.

Attema, P., De Haas, T. and Nijboer, B. 2003. The Astura project, interim report of the 2001 and 2002 campaigns of the Groningen Institute of Archaeology along the coast between Nettuno and Torre Astura (Lazio, Italy). *Babesch,* 78: 107-140.

Attema, P. and Alessandri, L. 2012. Salt production on the Tyrrhenian coast in South Lazio (Italy) during the Late Bronze Age: its significante for understanding contemporary society. In V. Nikolov and K. Bacvarov (eds.), *Salz und Gold: die Rolle des Salzes im prähistorischen Europa / Salt and Gold: The Role of Salt in Prehistoric Europe. Provadia-Veliko Tarnovo, 2012*: 287-300.

Belardelli, C. 1999. Torre Valdaliga. In *Ferrante Rittatore Vonwiller e la Maremma 1936 -1976. Paesaggi naturali, umani, archeologici, Atti Convegno Ischia di Castro* 1998: 79-90.

Belardelli, C. and Pascucci, P. 1998. Il villanoviano a nord di Roma: siti costieri del territorio di Civitavecchia. *Atti XIII Congresso Internazionale UISPP*, vol. 4, Forlì: 409-417.

Belardelli, C. and Pascucci, P. 2002. Lo sfruttamento delle risorse marine nell'età del ferro: il caso di Marangone (S. Marinella - RM). In N. Negroni Catacchio (ed.) *Atti V Incontro di Preistoria e Protostoria in Etruria*: 241- 255.

Belardelli, C., Trucco, F. and Vitagliano, S. 2008. *Installazioni funzionali costiere nella prima età del ferro: elementi moderni di un paesaggio protostorico*. In N. Negroni Catacchio (ed.) *Atti VIII Incontro di Preistoria e Protostoria in Etruria*, vol. II: 663-666.

Cassen, S., De Labriffe, P. A. and Ménantau, L. 2004. Sels de mer, sels de terre. Indices et preuves de fabrication du sel sur le rivage de l'Europe occidentale, du Ve au IIIe millénaire. *Cuadernos de Arqueología, Universidad de Navarra* 12: 9-49.

Cassen, S. and Weller, O. 2013. Idées et faits relatifs à la production des sels marins et terrestres en Europe, du VIe au IIIe millénaire, *Setúbal Arqueológica* 14: 255-304.

Cassola Guida, P. 2014. Produzione di sale marino nell'alto Adriatico: le tracce più antiche. In O. Harl (ed.) *Hochtor und Glocknerroute: Ein hochalpines Passheiligtum und 2000 Jahre Kulturtransfer zwischen Mittelmeer und Mitteleuropa*. Sonderschriften des Österreichischen Archäologischen Institutes 50, Wien: 321-332.

Cassola Guida, P. and Montagnari Kokely, E. 2006. Produzione di sale nel golfo di Trieste: un'attività probabilmente antica. In *Studi di protostoria in onore di Renato Peroni*: 327-332. Firenze, All'Insegna del Giglio.

Di Fraia, T. 2006. Produzione, circolazione e consumo del sale nella protostoria italiana:dati archeologici e ipotesi di lavoro. In *Materie prime e scambi nella preistoria italiana*, *Atti XXXVIX Riunione Scientifica IIPP,* vol. III: 1639-1649.

Di Fraia, T. 2008. Il sale come fattore trainante della produzione e degli scambi nelle zone interne nella preistoria italiana. In H. Richard and D. Garcia (eds.) *Le peuplement de l'arc alpin*. CD-Rom Edition du CTHS: 289-298.

Di Fraia, T. 2010. Aggiornamenti e riflessioni sul problema del sale nella preistoria e nella protostoria. In N. Negroni Catacchio (ed.) *Atti IX Incontro di Preistoria e Protostoria in Etruria*: 597-607.

Di Fraia, T. 2011. *Salt production and consumption in prehistory: towards a complex systems view*. In A.

Vianello (ed.) *Exotica in the Prehistoric Mediterranean*. Oxbow Books, Oxford: 26-32.

Di Fraia, T. and Secoli, L. 2000. Un contributo alla conoscenza della produzione del sale nella preistoria. Il sito di Isola di Coltano presso Pisa. *Naturalmente,* anno 13, n. 3: 62-67.

Di Fraia, T. and Secoli, L. 2002. Il sito dell'età del bronzo di Isola di Coltano. In N. Negroni Catacchio (ed.) *Atti V Incontro di Preistoria e Protostoria in Etruria*: 79-93.

Harding, A. 2013. *Salt in Prehistoric Europe*. Leiden, Sidestone Press.

Lonza, B. 1981. *La ceramica del castelliere degli Elleri*. Ed. Italo Svevo, Trieste.

Montagnari Kokelj, E. 2005. Some considerations on salt exploitation at Trieste Karst in prehistory. Godišniak / Univerzitet u Sarajevu 34: 47-81.

Montagnari Kokelj, E. 2007. Salt and the Trieste Karst (North-Eastern Italy) in Prehistory: some considerations. In D. Monah, Gh. Dumitroaia, O. Weller and J. Chapman (eds.) *L'exploitation du sel à travers le temps.* BMA, XVIII, Piatra-Neamţ: 161-189.

Montagnari Kokelj, E., Bernardini, F., De Min, A., Lenaz, D., Tuniz, C. and Velušček, A. 2015. Il sale nel Caput Adriae (Adriatico nord-orientale): dati, ipotesi, prospettive di approfondimento. *50 Riunione Scientifica IIPP, Manipolare e conservare, Sessione 3* (online).

Pacciarelli, M. 1991. Territorio, insediamento, comunità in Etruria meridionale agli esordi del processo di urbanizzazione. *Scienze dell'Antichità* 5: 163-208.

Pacciarelli, M. 1994. Sviluppi verso l'urbanizzazione nell'Italia tirrenica protostorica. In P. Gastaldi and G. Maetzke (eds.), *La presenza etrusca nella Campania meridionale*, pp. 227-253.

Pacciarelli, M. 1999. Le origini di Vulci e il suo entroterra. In R. Peroni and L. Rittatore Vonwiller (eds.), *Ferrante Rittatore Vonwiller e la Maremma, 1936-1976: paesaggi naturali, umani, archeologici. Atti del convegno (Ischia di Castro 1998)*, Grotte di Castro 1999: 55-67.

Pacciarelli, M. 2001. *Dal villaggio alla città. La svolta protourbana del 1000 a. C. nell'Italia tirrenica*. Firenze, All'Insegna del Giglio.

Pacciarelli, M. 2010. Verso i centri protourbani. Situazioni a confronto da Etruria meridionale, Campania e Calabria. *Scienze dell'Antichità* 15 (2009): 371-416.

Pasquinucci, M. and Menchelli, S. 1997. Isola di Coltano (Coltano-PI). In A. Zanini (ed.), *Dal Bronzo al ferro. Il II millennio a.C. nella Toscana centro-occidentale*: 49-53. Pisa.

Pasquinucci, M. and Menchelli, S. 1999. The landscape and economy of the territories of Pisae and Volaterrae (coastal North-Etruria). *Journal of Roman Archaeology* 12: 123-141.

Pasquinucci M. and Menchelli S. 2002. The Isola di Coltano Bronze Age village and the salt production in North coastal Tuscany (Italy). In O. Weller (ed.) *Archéologie du sel, Techniques et sociétés dans la Pré- et Protohistoire européenne*: 177-182.

Secoli, L., 2000. *Il sito dell'età del bronzo di Isola di Coltano*, Tesi di Laurea in Preistoria e Protostoria, Università degli studi di Pisa.

Tencariu, F-A., Alexianu, M., Cotiuga, V., Vasilache, V. and Sandu, I. 2015. Briquetage and salt cakes: an experimental approach of a prehistoric technique. *Journal of Archaeological Science* 59: 118-131.

Trucco, F., di Gennaro, F. and d'Ercole, V. 2002. Contributo alla conoscenza della costa dell'Etruria meridionale nella protostoria: lo scavo 1994 al Marangone (S. Marinella - RM). In N. Negroni Catacchio (ed.) *Atti V Incontro di Preistoria e Protostoria in Etruria*: 231-240.

Valera, A., Tereso, J. and Rebuge, J. 2006. O Monte da Quinta 2 (Benavente) e a produção de sal no Neolítico final/Calcolítico inicial do estuário do Tejo [Monte da Quinta 2 (Benavente) and the production of salt in the Late Neolithic/Early Calcolithic of the Tagus estuary]. *Actas do IV Congresso de Arqueologia Peninsular. Do Epipaleolítico ao Calcolítico na Península Ibérica. Promontória Monográfica*, 4: 291-305.

Weller, O. 1998. L'exploitation du sel: techniques et implications dans le Néolithique européen. *Atti XIII Congresso UISPP*, vol. 3: 281-287. A.B.A.C.O. Edizioni, Forlì.

Yankowski, V., Kerdsap, P. and Chang, N. 2015. 'Please pass the salt' – An ethnoarchaeological study of salt and salt fermented fish production, use and trade in Northeast Thailand. *Journal of Indo-Pacific Archaeology* 37: 4-13.

Salt in Southwest Germany at the End of the Iron Age

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Abstract

Rock salt layers can be found underground throughout most of the southwestern part of Germany. These rock salt layers are the origin of a large number of salt wells with a low salt content. The use of these wells by prehistoric man can be assumed for the Neolithic and Bronze Age, but it is only attested for the Late Iron Age, and from the Middle Ages until present. There are several probable locations of prehistoric salt production sites. Of these, only the Schwäbisch Hall site has been excavated on a small scale in 1939/40. The results of this excavation, combined with the finds from Iron Age salt works in other parts of Germany and with ethnographic observations, led to a reconstruction of the salt making process. During about four centuries of the Late Iron Age, salt was produced from brine using briquetage vessels at the Schwäbisch Hall site. At least a part of this salt was transported inside the briquetage vessels used for its production. Fragments of these containers have been found at settlement sites at distances up to 100 km from the production site.

During a current research project about the Late La Tène period settlement in the district of Heilbronn, we are examining briquetage distribution in settlement sites, possible trade routes, and possible uses of salt. New excavations and the re-examining of older collections allowed us to distinguish between five different types of Iron Age briquetage vessels, and to assemble new distribution maps. Apparently waterways were preferred for salt transport from producers to consumers, but new research also shows possible land routes. At the Nordheim site, with two settlement enclosures dating from the 2nd and 1st century BC, people used large amounts of salt, probably for the conservation of meat. This site may also have served as a center for storage and redistribution.

Keywords: salt, Iron Age, briquetage, salt transport.

Rock salt layers can be found underground throughout most of the southwestern part of Germany. They are situated in strata of Middle Triassic shell-bearing limestone, at a depth of 100 to 200m (Hansch and Simon 2003). These rock salt layers are the origin of a large number of salt springs with a low salt content, in the valleys of the rivers Neckar, Jagst, Kocher and Tauber (Figure 1).

Despite their low salt content (< 5 %), the use of these springs has been documented since the Middle Ages. Before the start of industrial salt mining in the 19th century, salt was produced at several salt works in the region by boiling salt water from natural salt springs and artificial wells. The springs used in historic times are also potential sites of prehistoric salt works.

One of these salt well zones is situated in the middle Neckar valley, north of Heilbronn, around the mouths of the tributary rivers Jagst, Kocher and Sulm. In this area, salt production has been proposed as a source of wealth for some large settlements of the late Neolithic Michelsberg Culture, and for a cluster of large settlements and rich burials of the late Bronze Age Urnfield Culture (summarized in Hees 2012). The use of these salt wells can be assumed for the Neolithic and Bronze Age, but given the present state of research, it is only attested for the late Iron Age, and from the Middle Ages until present.

There are several probable locations of prehistoric salt production sites in southwestern Germany. Of these, only the Schwäbisch Hall site has been excavated on a small scale in 1939/40 (Kost 1940; Hommel 1940; Veeck 1940). It had been discovered in 1939 during construction work, at a depth of 5 – 6 m below the old town center of Schwäbisch Hall. Since then, only small-scale rescue excavations have taken place, and the extent of the salt work site has been determined by augering.

During the excavations, ca. 30.000 fragments of briquetage were found, consisting of salt boiling vessels, vessel supports and kiln wall parts. Based on the fragments found at Schwäbisch Hall, and similar finds from Iron Age salt works at Halle/Saale and Bad Nauheim, reconstructions for two different types of salt-boiling kilns have been proposed (for details see Hees 2012). The results of the excavation at Schwäbisch Hall, combined with the finds from Iron Age salt works in other parts of Germany, ethnographic observations, and experiments, led to a reconstruction of the salt making process (Hees 1999, 2010). During about four centuries of the late Iron Age, from the 5th to the 1st century BC, salt was produced from brine using briquetage vessels at the Schwäbisch Hall site.

During a current research project about late La Tène period settlements in the district of Heilbronn,

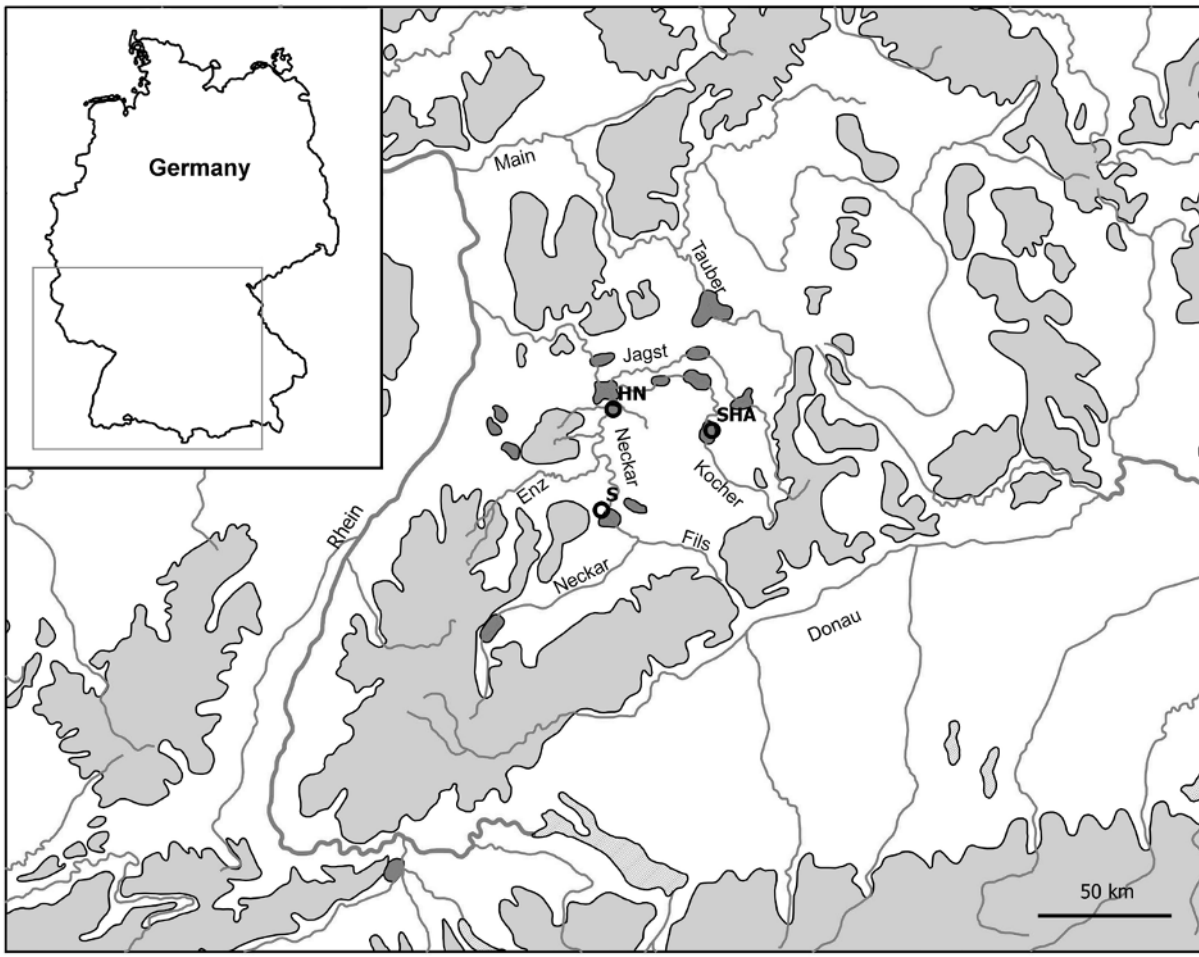

Figure 1. The southwestern part of Germany. Dark shaded areas with salt springs.
S: Stuttgart, HN: Heilbronn, SHA: Schwäbisch Hall.

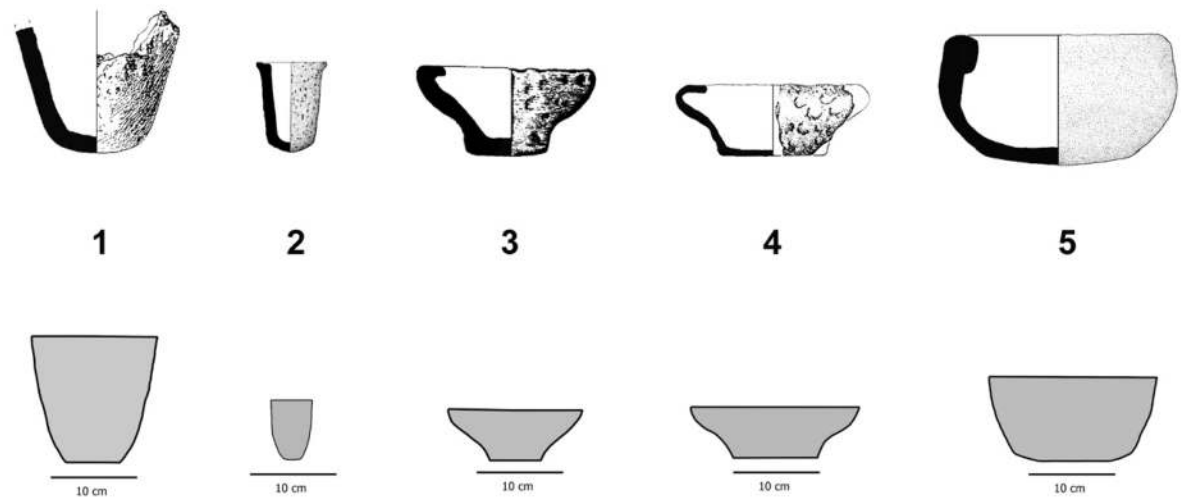

Figure 2. Iron Age briquetage types 1 – 5, shown to same scale, with the approximate volume of salt.

supported by the German Research Foundation (DFG), we are examining briquetage distribution in settlement sites, possible trade routes, and possible uses of salt. New excavations and the re-examination of museum collections allowed us to distinguish between five different types of Iron Age briquetage vessels used in southwestern Germany, and to assemble new distribution maps. In Figure 2, briquetage types 1 – 5 are shown at the same scale, with the approximate volume of salt produced.

Type 1:

Large U-shaped vessels.
Late Hallstatt and early La Tène periods, (5th – 3rd centuries BC).
Figure 3
Dm. 15 – 20cm, H. 15 – 20cm, Vol. ca. 900cm³

The temper consists of sand and very coarse, rounded river gravel. The inner surface is smooth and compact; the outer surface is only summarily smoothed and sometimes shows traces of fingers. These vessels were set on massive pillars with forked tops (25 – 30 cm high) inside high salt-boiling kilns.

Briquetage of this form was found in small numbers at the Schwäbisch Hall salt works site. The distribution includes the middle Neckar valley and single find-spots to the northeast around the town of Würzburg. Their form and size are very similar to early Iron Age briquetage vessels from central Germany around Halle/ Saale, situated more than 300km to the northeast.

Type 2:

Small U-shaped vessels.
Late Hallstatt and early La Tène periods, (5th – 3rd centuries BC).
Figure 4
Dm. 5 - 6cm, H. 10 - 12cm, Vol. ca. 300cm³

The temper is made up of sand and coarse gravel. The inner surface is smooth and compact, probably modelled over a wooden form. The outer surface has impressions of sand or chaff. This form was set on pillars with forked tops (ca. 20 – 25 m high) inside high salt boiling kilns.

Of these vessels only a small number was found at the Schwäbisch Hall salt works site.

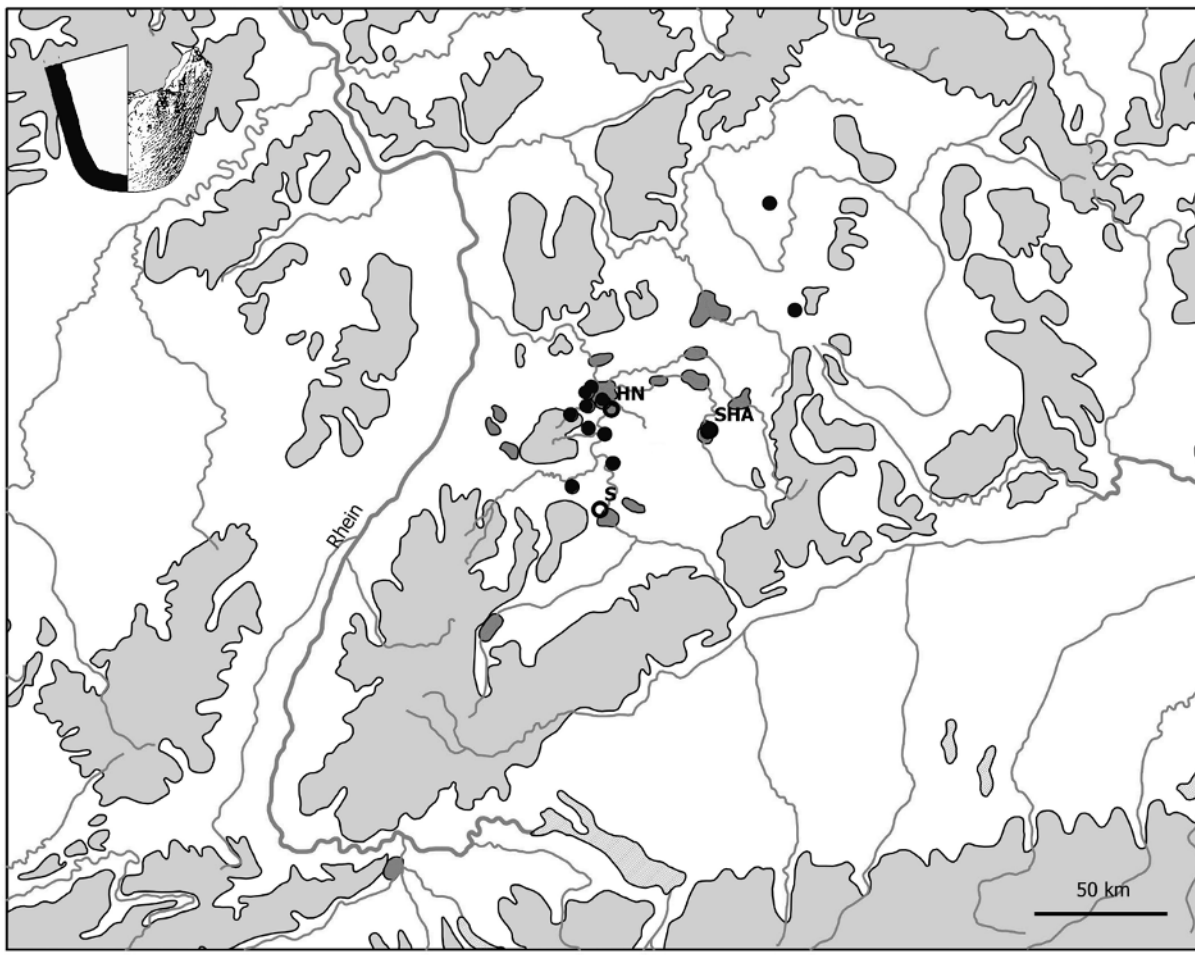

Figure 3. Distribution of type 1 briquetage vessels. S: Stuttgart, HN: Heilbronn, SHA: Schwäbisch Hall.

This form occurs at a large number of find-spots in settlement sites; the distribution is centered on the middle Neckar area. There was probably another production site using this vessel form somewhere in the Neckar valley north of Heilbronn.

Types 3/4:

Large open bowls with flat bottom, curved walls and inward folded rim.
Middle and late La Tène period (3rd – 1st centuries BC).
Figure 5
Dm. 15 - 25cm, H. 5 - 7cm, Vol. ca. 700cm³

The temper is sandy and sometimes there are sand impressions on the outer surface. The vessels were set on low clay cylinders (6 – 8 m high) inside low saltboiling kilns.This vessel form occurs in two variants, with thin walls (measuring less than 5mm) and thicker walls (ca. 10mm). It is not always possible to distinguish between the variants, especially when only small fragments are present. Both variants are combined on one distribution map.

This is the most common briquetage form at the Schwäbisch Hall salt works, making up nearly 90 % of the excavated fragments. Their distribution is centered on the middle Neckar area, but there are also find-spots in the Kocher and Tauber valleys, which are possible locations of yet unknown salt works.

Type 5:

Large open bowls with small flat bottom and massive rim.
Late La Tène period (2nd and 1st centuries BC).
Figure 6
Dm. 20 – 25cm, H. 10 – 15cm, Vol. ca. 2000cm³

The temper consists of sand and gravel. Sand impressions on the outer surface are common.

These vessels are known only from a small number of settlement sites, mostly from rectangular enclosures (Viereckschanzen). This form is distributed mainly in the middle Neckar area, with single find-spots on the

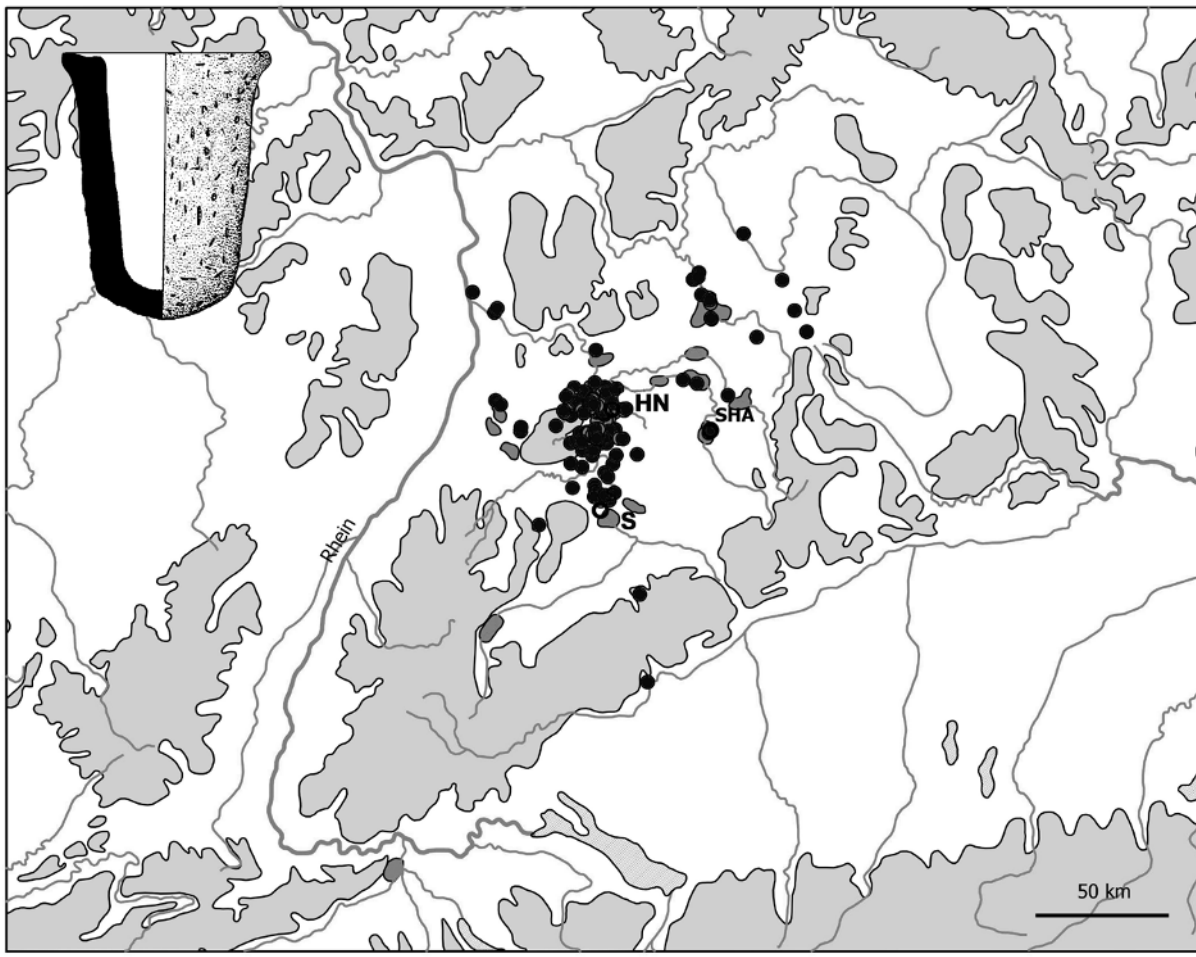

Figure 4. Distribution of type 2 briquetage vessels.
S: Stuttgart, HN: Heilbronn, SHA: Schwäbisch Hall.

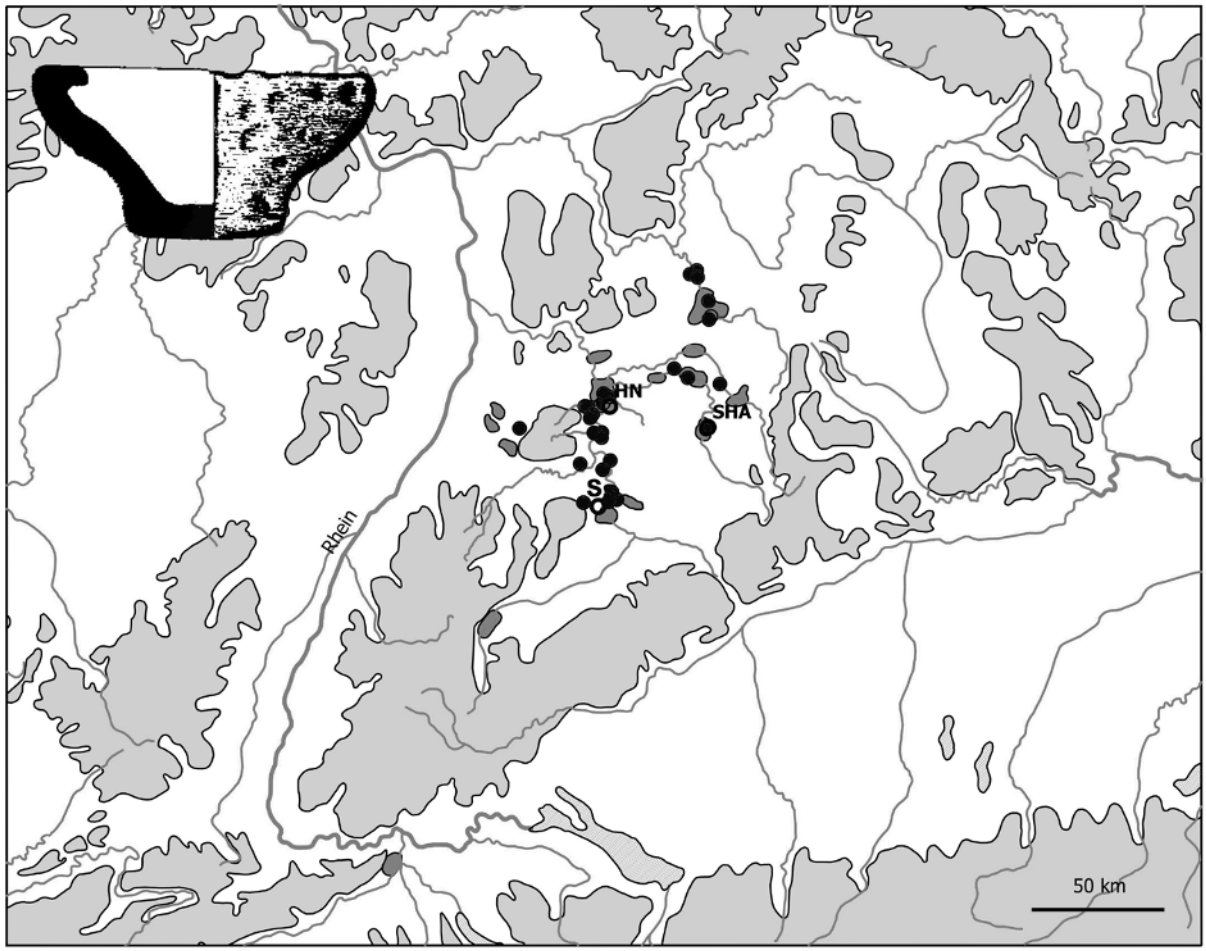

Figure 5. Distribution of types 3 and 4 briquetage vessels.
S: Stuttgart, HN: Heilbronn, SHA: Schwäbisch Hall.

Swabian Jura and in the Danube valley, notably also at the Manching oppidum.

No briquetage vessels of this form were found at the Schwäbisch Hall salt works site. They were used in a kiln of unknown form at another, yet unknown salt production site. This site is probably located somewhere in the Neckar valley north of Heilbronn.

Apart from the above mentioned vessel forms, some variations occur only in single vessels; those are not considered here.

Briquetage fragments have been found at settlement sites far outside the possible production areas, at distances of up to 100km from the Schwäbisch Hall salt works. So, at least part of the salt was transported inside the boiling vessels, sometimes over quite considerable distances, corresponding to several days' travel. The distribution maps show briquetage finds of all types, mainly in settlements along the rivers and on the fertile loess soils along the Neckar river and its tributaries. Apparently, waterways were preferred for salt transport from producers to consumers. River transport by boat also was the easiest way for distribution of possible trade goods like wine amphorae, millstones or iron ingots, that could be imported to the salt production areas and exchanged for salt.

During the middle and late La Tène period, large numbers of Mediterranean wine amphorae were imported to central Europe. These imports reached southern Germany by way of the Rhône valley and either the Saône or the Swiss plateau and were distributed along the waterways of the Rhine and Danube valleys (Nick 2005: 48-49). Fragments of wine amphorae are much more common in settlement sites of the Rhine valley than along the Neckar and its tributaries. Following the Neckar from the Rhine up to the foothills of the Swabian Jura, some imported wine amphorae reached settlement sites like Nordheim, where only a few fragments were found. Larger numbers reached the Heidengraben oppidum, situated on the Swabian Jura above the Neckar valley (Fernández-Götz 2012). At the present state of research, amphora imports are limited to fortified settlements and possible distribution

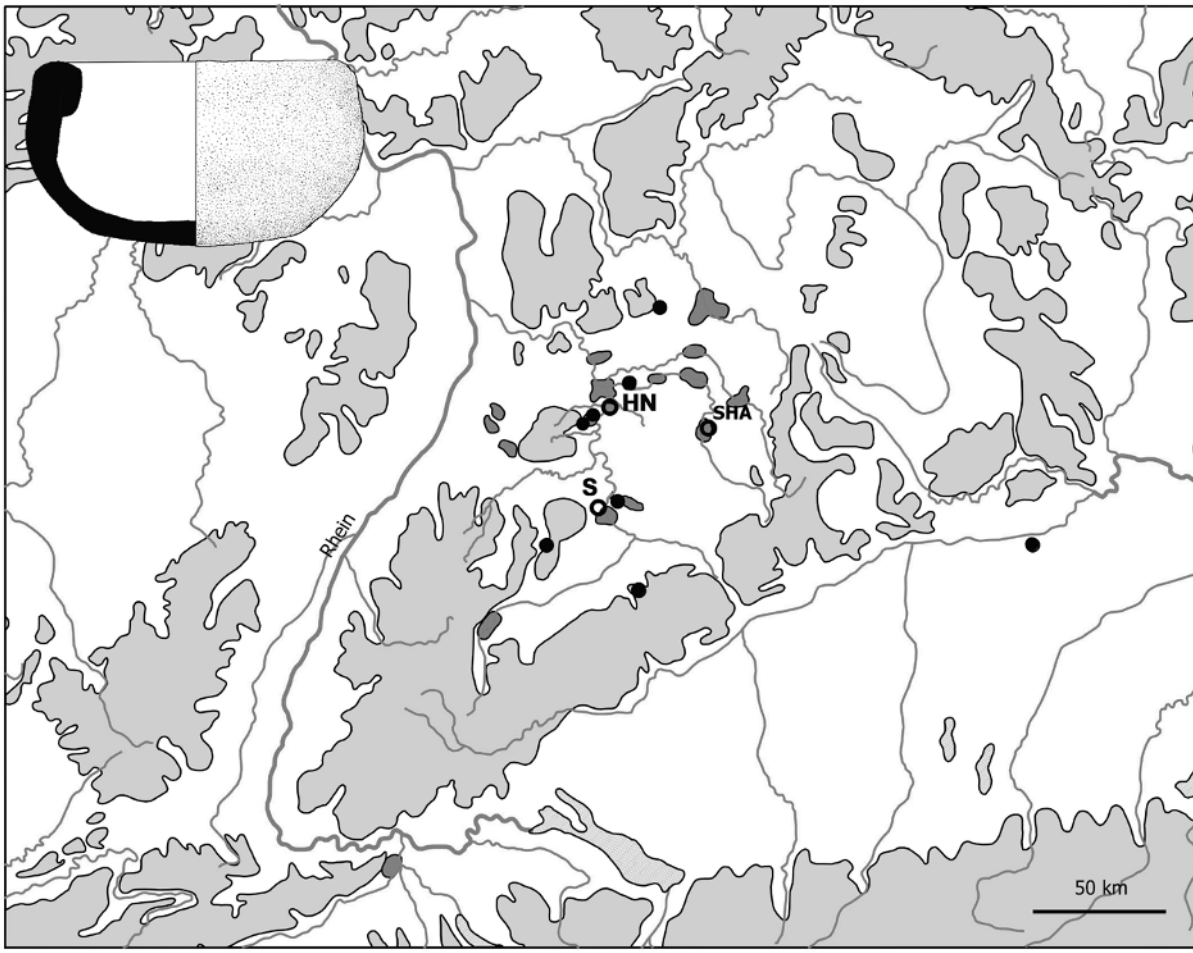

Figure 6. Distribution of type 5 briquetage vessels.
S: Stuttgart, HN: Heilbronn, SHA: Schwäbisch Hall.

centres; none have been found at the actual salt work sites. All these amphorae belong to forms Dressel 1A and early 1B (Wieland 1996: 164-166), dated to the 2nd and early 1st century BC.

In southwest Germany, mostly local stones were used for the production of grinding stones in the Hallstatt and early La Tène periods, then of rotary quern during the middle and late La Tène period. In the middle Neckar region several types of local sandstone were used for this purpose. Additionally, grinding stones and rotary mills made of volcanic rocks from the Eifel region were distributed by water transport on the Rhine (Wefers 2014) and also reached the Neckar river system. Another source of volcanic rock used for grinding stones and rotary mills lies near Dossenheim in the western part of the Odenwald mountains, near the lower Neckar valley. From there water transport was possible on the Neckar and its tributaries (Bock and Lehmkuhl 2006). The map in Figure 7 shows the area of origin of volcanic rocks in the western Odenwald mountains, corresponding to the northwestern limit of early La Tène period briquetage distribution. It points to a probable trade of salt from the middle Neckar and Kocher valleys for grinding stones from the Odenwald, similar to the contemporary situation on the lower Rhine, where salt from the North Sea coast was traded for grinding stones from the Eifel mountains (Simons 1987). During the middle and late La Tène period, volcanic rotary mills from the Odenwald arrived at settlement sites in the middle Neckar valley and even at the Heidengraben oppidum on the Swabian Jura, but no contemporary briquetage fragments are known from the quarry areas.

Another possible trade good to be exchanged for salt were iron ingots. The areas around the salt wells do not contain exploitable iron deposits. Early La Tène period iron production (Gassmann and Wieland 2015) took place in the northern Black Forest and on the eastern Swabian Jura (Figure 7). In the Neckar valley, La Téne period iron ingots were found during dredging operations on the river bottom at Bad Friedrichshall (Wieland 1996: 67-68). Deposits of iron ingots on dry land have been found during excavations near the

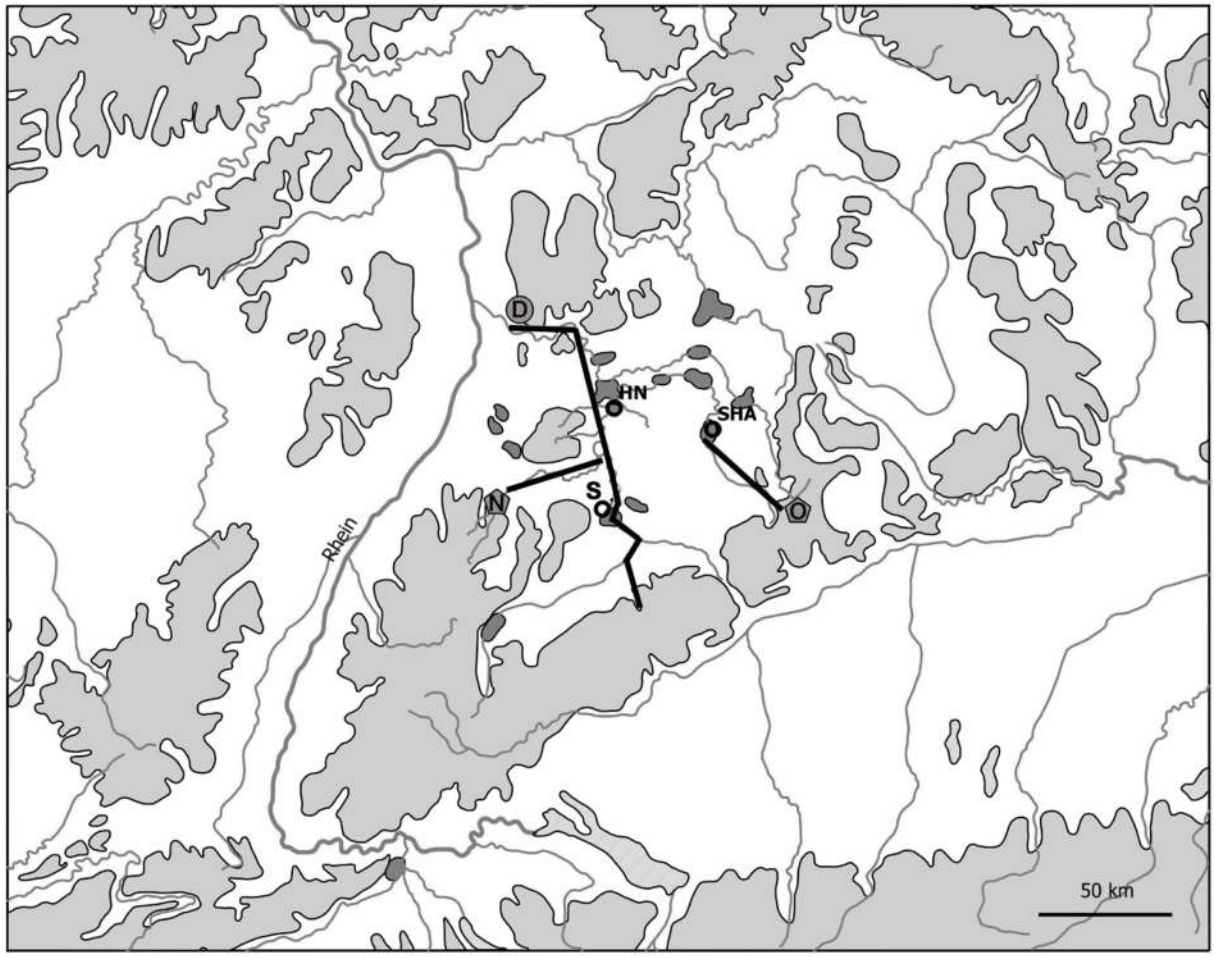

Figure 7. River transport routes along the Neckar and its tributaries.
D: Dossenheim quarry, N: Neuenbürg iron production, O: Eastern Swabian Jura iron production,
S: Stuttgart, HN: Heilbronn, SHA: Schwäbisch Hall.

river at Horkheim and Pleidelsheim (Wieland 1996:67-68; Bofinger and Schmid 2011). Probably the transport of iron ingots was done by boat on the Neckar and its tributaries, from the iron producing regions to the densely settled Neckar valley, and to the probable salt producing area around Heilbronn. But there is no evidence for any import of briquetage vessels in the iron producing areas.

River transport by small boats was easier and more economical than land transport. However, land transport would have been necessary to reach areas away from navigable rivers, and to cross the major watersheds. Natural obstacles like mountain ranges limited possible land routes, allowing tentative reconstructions of iron age cart roads and pathways (Figure 8). Gerd Stegmaier (Stegmaier 2009: 162-164; 2012) shows a series of sites from the middle and late LaTène period following the valleys of two small rivers, the Fils and the Lone, marking a probable late Iron Age route from the Neckar valley across the Swabian Jura mountain range to the Danube valley (Figure 8B). Small numbers of briquetage vessels were found at late Iron Age settlement sites on the Danube, like the early La Tène period village at Riedlingen, and the Manching oppidum. Other possible routes to the Danube valley farther to the east have been proposed by Günther Wieland (Wieland 1996: 175-176) and Rüdiger Krause (Krause 2004: 20) through the Nördlinger Ries basin (Figure 8C), or by Claudia Pankau (Pankau 2005) through the Brenz and Kocher valleys. Julia Koch and Roman Scholz (Koch and Scholz 2015: 77-78) proposed an early Iron Ae route from the Neckar valley across the Black Forest to the upper Rhine valley (Figure 8A). A similar route had already been proposed by Gabriele Weber (Weber 1989: 287) for the late Iron Age, based on numismatic evidence. No briquetage vessels were found in Iron Age settlement sites of the upper Rhine valley. There is no archaeological evidence for salt transport to the upper Rhine valley, neither to the late Hallstatt / early La Tène period 'princely sites,' nor to the middle to late La Tène period open settlements and fortified oppida.

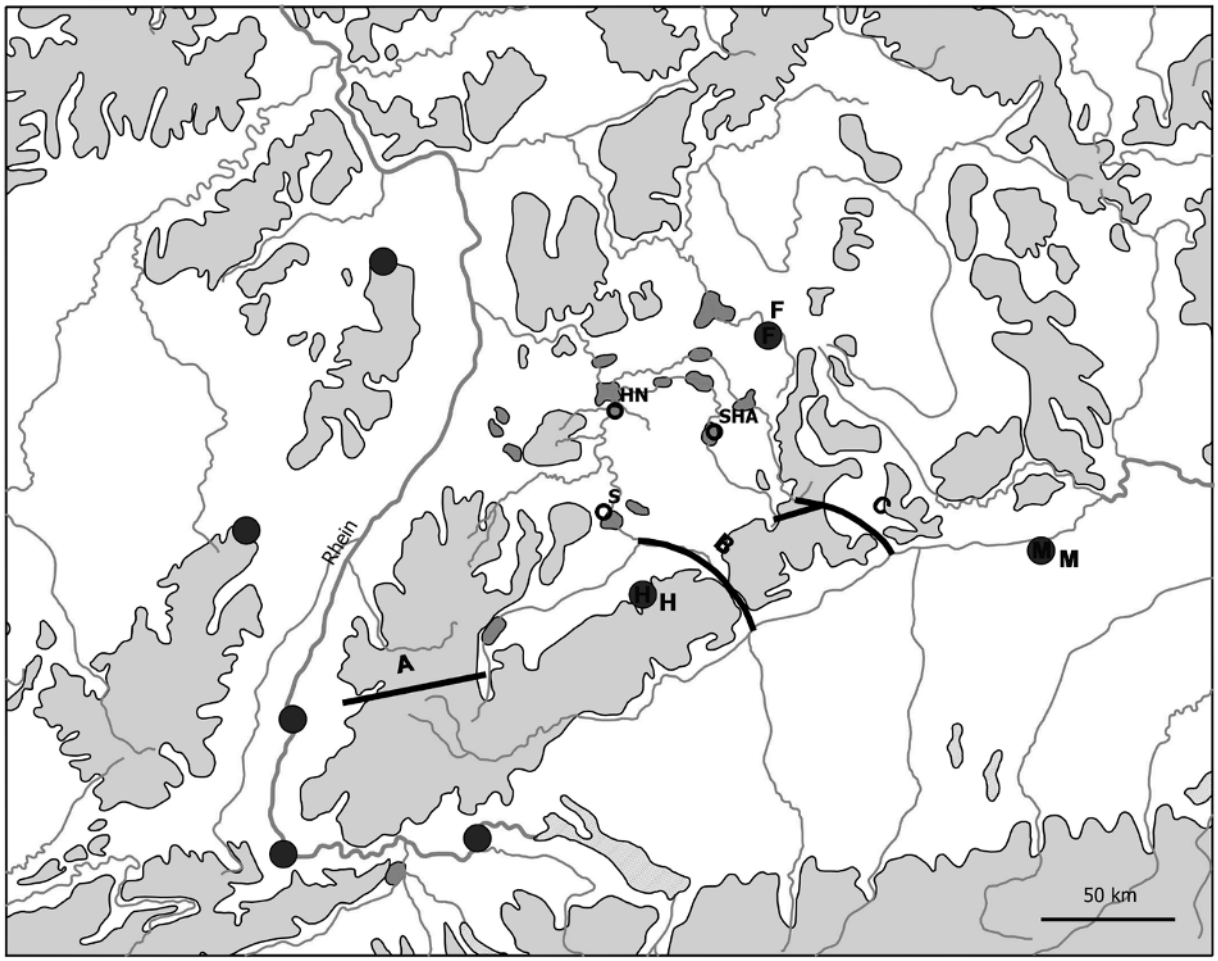

Figure 8. Possible land transport routes across the Black Forest and the Swabian Jura. Black circles: late La Tène period oppida.
F: Finsterlohr oppidum, H: Heidengraben oppidum, M: Manching oppidum. S: Stuttgart, HN: Heilbronn, SHA: Schwäbisch Hall.

During the Iron Age, the majority of the population in southern Germany lived in small agricultural settlements. Most of the sites where briquetage fragments have been found belong to this category. At the consumer sites, salt played an important role in the preservation of foodstuffs. It could be used to preserve meat and meat products, as well as cheese and certain plant foods. Most of the salt probably was used seasonally to preserve food for winter storage. Salt could also be used in the preservation of hides for tanning, or it could be added to animal food to improve milk production. During the late Hallstatt and early La Tène period, the known salt production site at Schwäbisch Hall as well as other possible salt production sites, and a large part of the whole briquetage distribution zone, are situated outside the recognizable zones of influence of the so-called 'princely seats.' Such zones were defined as circles with an approximate 15 – 20km radius by the DFG 'Fürstensitze' research project (Balzer 2008: 151). Also, the peak of salt production at the Schwäbisch Hall saltworks occurred during the 3rd – 1st centuries BC, at a time when the 'princely seats' no longer existed. Similarly, in the middle and late La Tène period, the known and possible production sites and most of the briquetage distribution zone lie outside the probable zones of direct influence of the large settlements and oppida (Hees 2012). From the 5th until the 1st century BC, salt transported in briquetage vessels reached all kinds of settlements inside the distribution zone. Neither 'princely seats' nor oppida occupied a special position in the salt distribution networks.

The example of the Nordheim enclosures:

At Nordheim in the Heilbronn district, two rectangular settlement enclosures ('Viereckschanzen') situated at a distance of 300m and both dating from the 2nd and 1st century BC, form a fortified settlement. Their study is at the centre of a current research project supported by the German Research Foundation (DFG). At the end of the Iron Age, the middle Neckar region has no fortified oppida and no large open settlements; the next oppida are situated at distances of nearly 100km. The regional settlement pattern combines rectangular enclosures and clusters of small open settlements. Parts of two balances, as well as gold and silver coins, point

to the enclosures' roles in trade and in the early stages of a monetary economy. Elements of an 'aristocratic' lifestyle include large habitation buildings, painted tableware, sherds of wine amphorae and fragments of iron weapons. The Nordheim enclosures may also have served as a centre for storage and redistribution. Storage capacities include grain storage pits and four-post granaries. Among the pottery there are local imitations of large Mediterranean storage vessels (*dolia*). A large number of storage vessels covered with birch tar, probably used to store salted foods, make up ca. 9% by weight of the pottery. Among the finds from Nordheim are 1500 briquetage fragments, corresponding to ca. 10% of the total pottery weight. In southern Germany, this is the largest briquetage find complex ever found outside a salt works. It represents salt use on a large scale, not salt production. Only ca. 10% of the fragments belong to Type 3/4 bowls from the Schwäbisch Hall salt works. More than 90% belong to Type 5 bowls, originating from another, yet unknown salt production site. At the Nordheim enclosures, people used large amounts of salt, probably for the conservation of meat. Analysis of animal bones is ongoing; there is more than one metric ton of animal bones. Preliminary results show bones predominantly from domesticated animals, with a large part being bovines. What were the reasons for conserving large amounts of meat or meat products? Did the enlosures serve as fortified central storage places, not only for the inhabitants, but also for people living in small open settlements in the surroundings? Salted beef and other foods could have been stored for use during winter, but also for consumption at communal meetings, feasts or banquets.

Acknowledgements

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References

Balzer, I. 2008. Die Erforschung der Siedlungsdynamik im Umfeld des frühkeltischen Fürstensitzes Hohenasperg, Kr. Ludwigsburg, auf archäologischen und naturwissenschaftlichen Grundlagen. Mit einem Nachtrag 'Zu den Anfängen des Projektes' von Jörg Biel. In D. Krausse (ed.), *Frühe Zentralisierungs- und Urbanisierungsprozesse. Zur Genese und Entwicklung frühkeltischer Fürstensitze und ihres territorialen Umlandes. Kolloquium des DFG-Schwerpunktprogrammes 1171 in Blaubeuren, 9.-11. Oktober 2006. (Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg 101)*: 143-161. Stuttgart, Theiss.

Bock, C. and Lehmkuhl, A. 2006. Die eisenzeitlichen Gesteinsfunde vom Heidengraben. In T. Knopf (ed.), *Der Heidengraben bei Grabenstetten. Archäologische Untersuchungen zur Besiedlungsgeschichte. Universitätsforschungen zur prähistorischen Archäologie 141*: 175-195. Bonn, Habelt.

Bofinger, J. and Schmid, D. 2011. Vergraben und vergessen? – Keltische Eisenbarren oberhalb des Neckarufers bei Pleidelsheim, Kr. Ludwigsburg. In J. Bofinger and R. Schulz (eds.), *Entdeckungen. Höhepunkte der Landesarchäologie 2007-2010*: 84-85. Esslingen, Das Landesamt für Denkmalpflege.

Fernández-Götz, M. 2012. Nektar der Götter – der Wein. In D. Ade, M. Fernandez-Gotz, L. Rademacher, G. Stegmaier, A. Willmy (eds.), *Der Heidengraben – Ein keltisches Oppidum auf der Schwäbischen Alb. Führer zu archäologischen Denkmälern in Baden-Württemberg 27*: 91-94. Stuttgart, Theiss.

Gassmann, G. and Wieland, G. 2015. Die Wälder verbrennen im Feuer der Rennöfen. Keltische Eisenproduktion im Nordschwarzwald. In M. Rösch and T. Märkle (eds.), *Kelten, Dinkel, Eisenerz. Sieben Jahrtausende Siedlung und Wirtschaft im Enztal. Archäologische Informationen aus Baden-Württemberg, Heft 73*: 36-42. Esslingen, Landesamt für Denkmalpflege Baden-Württemberg.

Hansch, W. and Simon, T. (eds.) 2003. *Das Steinsalz aus dem Mittleren Muschelkalk Südwestdeutschlands. museo 20/2003*. Heilbronn, Städtische Museen.

Hees, M. 1999. Vorgeschichtliche Salzgewinung. Auf den Spuren keltischer Salzsieder. In C. Jacob and H. Spatz (eds.), *Schliz – ein Schliemann im Unterland? 100 Jahre Archäologie im Heilbronner Raum. museo 14/1999*: 154-173. Heilbronn, Städtische Museen.

Hees, M. 2010. Prehistoric Salt Production in Southwest Germany. In L. v. Falkenhausen and L. Shuicheng (eds.), *Zhongguo Yanye Kaogu / Salt Archaeology in China, 2*: 218-237. Beijing, Kexue Chubanshe.

Hees, M. 2012. Die Bedeutung der vorgeschichtlichen Salzgewinnung in Südwestdeutschland. In V. Nikolov and K. Bacvarov (eds.), *Salt and Gold: The Role of Salt in Prehistoric Europe*: 277-286. Provadia and Veliko Tarnovo, Faber.

Hommel, W. 1940. Keltische und mittelalterliche Salzgewinnung in Schwäbisch Hall. *Württembergisch Franken, Neue Folge* 20, 21: 129-144.

Koch, J. K. and Scholz, R. 2015. Das Große Bürgle von March-Buchheim im Breisgau. Großgrabhügel nördlich der Alpen und eine Kommunikationsroute durch den Schwarzwald. In R. Karl and J. Leskovar (eds.), *Interpretierte Eisenzeiten. Fallstudien, Methoden, Theorie. Tagungsbeiträge der 6. Linzer Gespräche zur interpretativen Eisenzeitarchäologie. Studien zur Kulturgeschichte von Oberösterreich, Folge 42*: 67-80. Linz, Oberösterreichisches Landesmuseum.

Kost, E. 1940. Die Keltensiedlung über dem Haalquell im Kochertal in Schwäbisch Hall. *Württembergisch Franken, Neue Folge* 20, 21: 39-111.

Krause, R. 2004. *Der Ipf. Frühkeltischer Fürstensitz und Zentrum keltischer Besiedlung am Nördlinger Ries. Archäologische Informationen aus Baden-*

Württemberg, Heft 47. Stuttgart, Das Landesamt für Denkmalpflege.

Neth, A. 2010. Kelten ohne Fürsten. Das Heilbronner Land während der vorrömischen Eisenzeit. In J. Bofinger and D. Krausse (eds.), *Aktuelle Forschungen zu den Kelten in Europa. Festkolloquium für Landeskonservator Jörg Biel am 1. August 2008 in Altheim, Kr. Biberach. Archäologische Informationen aus Baden-Württemberg, Heft 59*: 53-67. Esslingen, Das Landesamt für Denkmalpflege.

Nick, M. 2005. Wein gegen Sklaven – Der keltische Handel. In A. Bräuning et al., *Kelten an Hoch- und Oberrhein. Führer zu archäologischen Denkmälern in Baden-Württemberg, Band 24*: 48-54. Esslingen, Das Landesamt für Denkmalpflege.

Pankau, C. 2005. Die Besiedlungsgeschichte des Brenz-Kocher-Tals (östliche Schwäbische Alb) vom Neolithikum bis zur Latènezeit. *Archäologische Informationen* 28: 233-237.

Simons, A. 1987. Archäologischer Nachweis eisenzeitlichen Salzhandels von der Nordseeküste ins Rheinland. *Archäologische Informationen* 10, 1: 8-14.

Stegmaier, G. 2009. Bemerkungen zu Lage und Bedeutung des spätkeltischen Oppidums Heidengraben. Naturraum, Topographie und Ökonomie. In *Kelten am Rhein. Akten des dreizehnten Internationalen Keltologiekongresses 23. bis 27. Juli 2007 in Bonn. Beihefte Bonner Jahrbücher 58, 1*: 161-170. Mainz, Zabern.

Stegmaier, G. 2012. Amphoren, Zölle, Wegerecht – Handel und Verkehr um den Heidengraben. In Dorothee Ade et al., *Der Heidengraben – Ein keltisches Oppidum auf der Schwäbischen Alb. Führer zu archäologischen Denkmälern in Baden-Württemberg 27*: 86-91. Stuttgart, Theiss.

Veeck, W. 1940. Eine keltische Solesiederei in Schwäbisch Hall. *Württembergisch Franken, Neue Folge* 20/21: 112-128.

Weber, G. 1989. Neues zur Befestigung des Oppidums Tarodunum, Gemeinde Kirchzarten, Kreis Breisgau-Hochschwarzwald. *Fundberichte aus Baden-Württemberg* 14: 273-289.

Wefers, S. 2014. Schwarzes Gold der Eifel – Distribution von latènezeitlichen Drehmühlen des Steinbruchreviers um Mayen. In S. Hornung (ed.), *Produktion – Distribution – Ökonomie. Siedlungs- und Wirtschaftsmuster der Latènezeit. Akten des internationalen Kolloquiums in Otzenhausen: 28-30. Oktober 2011. Universitätsforschungen zur prähistorischen Archäologie, Band 258*: 115-127. Bonn, Habelt.

Wieland, G. 1996. *Die Spätlatènezeit in Württemberg. Forschungen zur jüngeren Latènekultur zwischen Schwarzwald und Nördlinger Ries. Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg 63*. Stuttgart, Theiss.

Salt Control and Distribution in the Southern Part of Eastern Carpathians. A Story of a Lost Dacian Hillfort

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Abstract

Given the existence of major salt deposits in the Curved Sub-Carpathians and the high density of Second Iron Age sites in the area of Teleajen, Doftana and Prahova valleys, the theory of large-scale salt exploitation and distribution activities organized in the named region, during the Dacian period, has become a *topos* within the archaeological community. On a closer scrutiny, neither direct evidences, nor strong enough indirect ones are currently available to support this interpretation. Instead, a connection with the major road passing the mountains here was considered as a more appropriate explanation. In this context, the study follows the story of a lost Dacian hillfort (*Piatra Verde*) located in the Slănic Valley, at the edge of the most important salt deposit in the southern part of the Eastern Carpathians, which was destroyed by a modern stone quarry, without any previous archaeological documentation. The few recovered data from *Piatra Verde* can however enhance the general layout described by the ensemble of Second Iron Age sites in the central part of Wallachian plain and the hilly or mountains regions located to the north, an areal extremely rich in salt resources in general.

Keywords: Salt exploitation and distribution, Major Roads, Iron Age, Dacian Hillfort, Slănic-Prahova.

Introduction

Salt exploitation in the Carpathians has many significant landmarks, most of them being in use from the prehistorical times (Harding, Kavruk 2013a; Cavruc, Chiricescu 2006). Among these an important salt area is located in the southern part of the Eastern Carpathians - Slănic - a name with Slavic origin, meaning *salty*, one of those places in the Prahova County where the salt rock reaches close to the earth surface. A small river flows here, also named Slănic, an affluent of the Vărbilău River which in its turn flows into Teleajen River. The area is best known for the massive salt resources exploitation started in Early Modern Age (16th-17th centuries), and for the beautiful spa which emerged here following a Modern Age collapse of one of the salt mines (Brătescu et al 1897: 530). The salty lake, still in use today, represents the centre of curative and touristic interests of Slănic resort. The place is also close to one of the main routes used among the times to pass the mountains in order to connect eastern Carpathian depressions and, further on, the entire Transylvania and Central Europe, with the Danubian Plane, Pontic areas and Balkan Peninsula.[1]

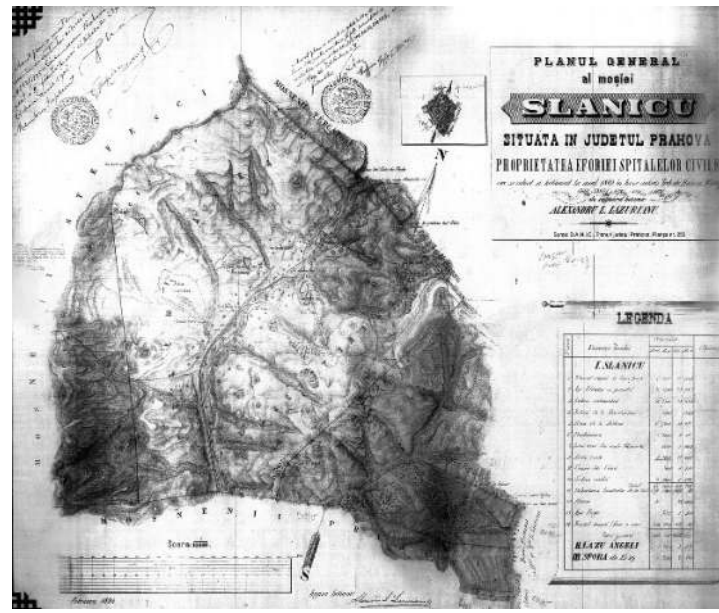

Figure 1. Slănic Land in 1893 – official topographical plan.

Slănic, as a settlement, was first attested in Late Medieval documents, from the 16th century, while the beginnings of the large scale salt exploitation begun in 1689, after the purchase of the land (Figure 1) by Mihai Cantacuzino, the brother of the Șerban Cantacuzino, the ruler of Walachia (Ciobanu 2006).

[1] The road is known as Tabla Buții Road, but also as Great Road to Brașov, Tatar Road, Teleajen Road and even as Buzău Road, see Ștefan and Ștefan 2018 with bibliography; Ciupercă 2010; Cruceru, Buterez 2012.

Pre-industrial salt mining and distribution in the Southern part of the Eastern Carpathians

Slănic was not the only major salt exploitation in the Southern part of the Eastern Carpathians. Other important places from Teleajen River Basin are on Teișani and Vitioara. Not far to the east is Telega, one of the earliest exploitations to be mentioned in Medieval documents (1562) (Ciobanu 2006). In fact, the area was so important that it alone, together with only two other salt mines located further to the west (at Ocnele Mari and Ocna Mică, nowadays in Vâlcea county), was enough to complete all the internal needs and the entire commerce with salt in Wallachia during the 17th century (Ciobanu 2006).

What can we say, though, about the pre-industrial use of the rich salt resources in the area of Teleajen Basin in the earlier periods? Until now, there were not enough data to directly prove mining activities here before the 16th century. One can count only the few wooden tools used for pre-industrial type of salt mining recently found at Predeal-Sărari, a site located some 5 km to the east of Teleajen River (Cavruc 2015). We know of similar kind of tools that had been found during the excavations in the important site from Băile-Figa (Harding, Kavruk 2013b) but also in other sites from different periods. Unfortunately, so far there are no radiocarbon dates for these artefacts found at Predeal-Sărari and because the tools' types haven't changed significantly from prehistory till modern times, the exact period of salt extraction here cannot be exactly specified.

In the context of the lack of written information and poor archaeological records, any hypothesis regarding pre-industrial salt exploitation and distribution relies solevecinityly on inference and circumstantial evidence. Among the possible indications we note the distribution of the authority centres, roads, military facilities, settlements and other special places in relation with known salt and other mineral resources. Other historical connections, some related with events or facts that took place far away, could help for a better picture. Going down progressively in time it is worth to mention the second half of the 1st millennium AD and also the time of Roman rule in Dacia.

For post-Roman and early medieval period our main interest questions the relation between the Tabla Buții Road and the whole field of activities related with salt. Was this road just a corridor for Transylvanian salt export to the Pontic, Danubian and Balkan regions? The existence and intensive use of the Tabla Buții Road is certain. Testimony for this is the successive series of fortresses from Slon (Comșa 1981, Comșa 1983), on the beginning of the high mountains segment of the road, at least for the 8th to 10th century AD. For the 9th and the 10th century there is a general agreement on the attainment of the control over the Transylvanian salt resources and associated commerce by Bulgarians in the context of the Avar kaganat dissolution (Madgearu 2001, Yotov 2014, Ciupercă 2010). Given this, the Tabla Buții road should be considered one of the main elements of the large scale salt distribution network in use at the time of the First Bulgarian Empire authority (Ciupercă 2010). About the extraction of the considerable salt resources located just in the nearby there is simply no data in the written documents. We can only assume that it was unlikely for such rich resources to remain unknown for the locals and for the authorities. We may note also the great implications for such a hypothesis to be true. It simply implies a more logical distribution of the salt extracted from Transylvania to the west while the local salt resources could have been the supply base for any southern regions and even for the depressions from south-eastern Transylvania.

Equally challenging is the attempt to figure out the place of the regional salt resources for Roman authorities. In the days of the Dacia Province, Romans seemed to have paid special attention to the Teleajen area, by implementing here complex strategies and policies regarding the salt resources, communication routes and barbarian tribes. One of the most intriguing questions regards the role of the Roman camps from Drajna de Jos, Mălăiești and Târgșor (Țentea, Matei-Popescu 2015). The location where the camps were placed founds its logic in the context of the Roman-Dacian wars and this seemed to be intimately linked with the existence of a main road and other connection roads already existent in the Second Iron Age. Also the two camps from the Teleajen River remain in use throughout the reign of Trajan protecting not only the roads but also the salt resources (Țentea, Matei-Popescu 2015).

Slănic in the Dacian times

For some time now, archaeologists noticed the high density of sites from the Second Iron Age that gravitates around Teleajen Valley (Figure 2, Figure 3). Consequently, these have been related both with the important road already mentioned but also with the vast salt resources in the area, especially with the ones from Slănic Valley. While the former assumption can be easily accepted - since at least in one place, at Tabla Buții, there are archaeological finds from this period – so far, there was no solid evidences to support the latter hypothesis.

The salt exploitation area from Slănic looks nowadays like a natural amphitheater, in a way resembling many other sites where salt rock come close or even reaches the surface. In these places the groundwater comes in contact with the salt rock triggering active erosion

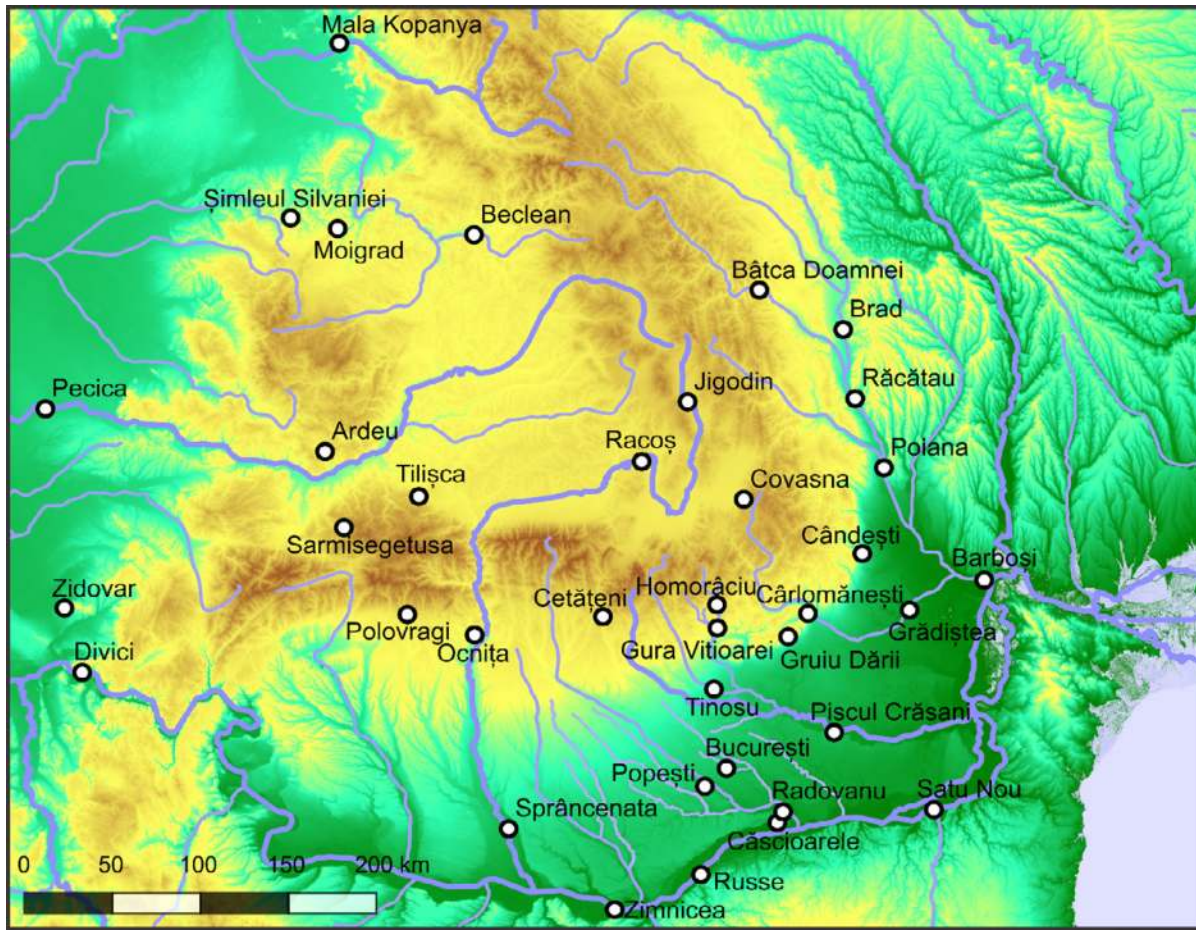

Figure 2. The main Central Places in Dacian Classical Period (not all the sites chronologically overlap, but the figure can be considered valid at least for the 1st century BC).

Figure 3. The remains of the Piatra Verde Hill and Slănic Valley in the background.

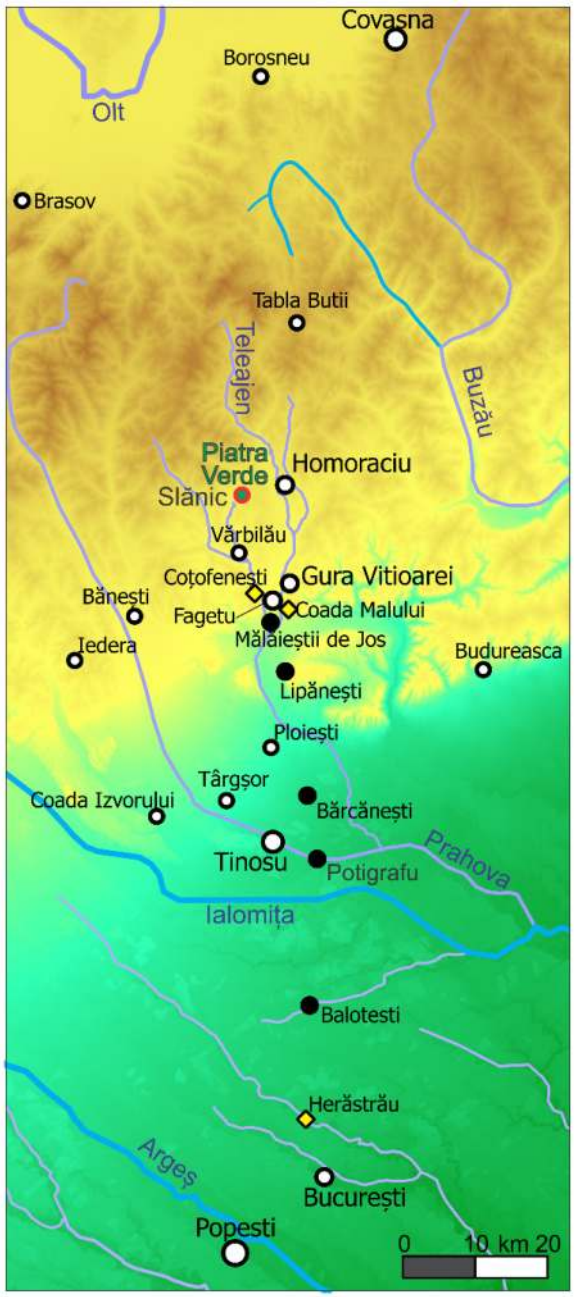

Figure 4. Southern part of Eastern Carpathians and the central part of Wallachia in the Second Iron Age (not all the sites chronologically overlap).

processes which in turn shape circular depressions of specific patterns. At Slănic, the lower salted areas are surrounded by rocky hills, especially on the western and northern sides. One of this hills, named *Piatra Verde* (Green Stone), guards from the above the entire Slănic Valley. The distinct shades of green of the fine sandstone making up the hill look beautiful, especially after rain.

This place attracted not only the eyes of the traveler but also the industry always starving for new raw

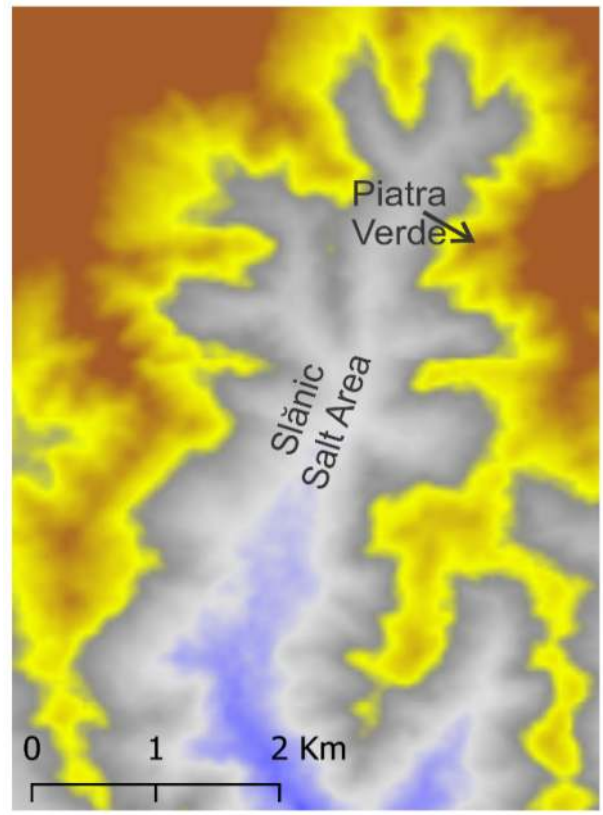

Figure 5. Slănic area and location of the Piatra Verde Hillfort.

materials. Today *Piatra Verde* is almost gone, most of it being destroyed by a stone quarry that worked here between 1960s and 1980s. Only by chance the place was visited by some archaeologists,[2] and only in the final part of the quarry's activity, in a time when only few square meters of the upper plateau were in place, in a very unstable and dangerous position. Still, they were able to find some pottery sherds. Also taking into account of the original morphology of the former hill the archaeologists concluded for the existence in the past of a hillfort here. However, until now, the hillfort from *Piatra Verde* was not properly reported in any academic paper (Teodorescu 1981: 59).[3]

Fortunately, few pottery fragments picked-up from the remaining part of the plateau have been deposited and recorded in the Prahova County Museum. Along with some undecorated fragments of walls originating from vessels of Late Iron Age types, few other fragments were able to give us with some details regarding the chronology and cultural context of the herein discussed hillfort. Two of the sherds were parts of the very common vessels frequently found on the sites

[2] Dan Lichiardopol, Eugen Paveleț, Radian Andreescu.

[3] Dan Lichiardopol mentioned in short the existence of the hillfort in an oral presentation (*Fortificații geto-dacice din bazinele Prahovei și Teleajenului*, Buzău, 2007). Radian Andreescu kindly informed the authors of the present paper about the short survey he undertook on the site in 1989.

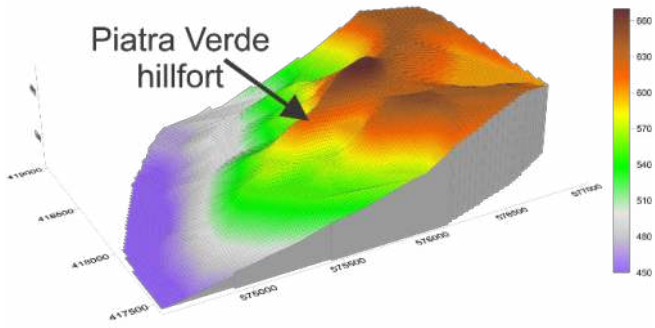

Figure 6. Virtual reconstruction of the land of Piatra Verde Hillfort.

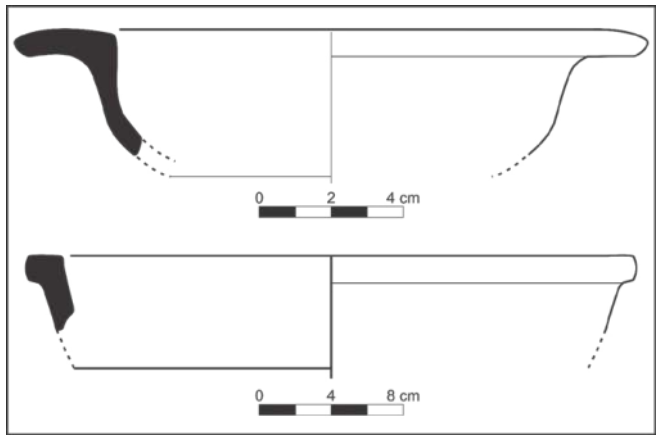

*Figure 7. Pottery fragments from Piatra Verde Hillfort. Up: medium size plate with a pod. Down: large storage container (*pythoi*).*

Figure 8. Fragment of a handle from a jug.

from Classic Dacian period,[4] namely a large storage container (*pythoi*) made on wheel (Figure 7, down) and a medium size plate with a foot (Figure 7, up). Of particular interest it is a fragment from a jug handle (Figure 8).

This kind of jugs are often called 'of Ciolănești type' and are commonly found in early horizons of the sites from the above mentioned period (mainly 2nd c. BC but also 1st c. BC, see Petrescu-Dâmbovița, Sanie 1972, Teodor, Vulpe 2003, Ganciu, Măndescu 2013).

The rocky hill of Piatra Verde was represented on some of the good old maps of the area (for example the 3rd edition of the Austrian Map from 1889, 1:200,000 scale) but a more accurate reconstruction of the original shape of the mountain was possible only by using data of more recent military maps (1:25,000 and 1:50,000 scale) still drawn on the basis of topographic surveys made before the massive destruction of the site (before 1960s). On the place where today is a large exhausted area supplemented with a modern road (DJ 102) on the southern side, the virtual reconstruction of the land reveals a prolonged hill that once was the terminal part of a long ridge surrounding the Slănic Valley but also going further to the north. The former shape of the *Piatra Verde* hill appears to resemble thus many other places where Iron Age fortresses or fortified settlements were built. The specific pattern for all of these sites are the steep slopes surrounding an elongated plateau on all sides, with a small wedge used as a linking corridor with the rest of the ridges from the nearby. A fortified system built-up on the corridor along with the steep slopes on all the other sides provides enough military protection for this system often called 'blocked promontory' (Glodariu 1983).

Discussion and conclusions

If we resume in one place all the data regarding the *Piatra Verde* hill we have to consider that there must have functioned a Dacian hillfort built and used at least in the 2nd – 1st c. BC. The chosen place was very well connected with the main road passing Carpathians on the Teleajen River, being also in the ideal position to control salt mining on the Slănic Valley and distribution of the salt along the main road. This is the first time when a solid proof (still an indirect one) can

[4] Dacian Classic period is the alternative name for the Late Second Iron Age (approx. 2nd century BC – beginning of 2 century AD) in the area of the pre-roman Dacia (Babeș 2010).

be highlighted to support an organized exploitation of the salt resources by the Dacians in the Slănic area and, by extension, also in other salt places from Teleajen River basin.

In the Wallachian plane and in the hilly areas surrounding the Curved Sub-Carpathians the spatial distribution model of the central places and open settlements from the Classical Dacian period reveals a relative complex, but easy to decipher pattern. Thus, the sites are massively chained-up a) along the terraces of the water courses, b) in unflooded places along the Danube and c) at the interface between hills and the plain. This pattern seems to be somehow superimposed by a cluster of central places, settlements, funerary areas and some focal points where treasures were found.

Seen on a map (Figure 4) this outlier cluster behaves untypically, being organized along a straight north-south line, in what appears to be a road passing, not just the mountains, but also crossing all the valleys, water courses and inter-fluvial areas. As a whole, the cluster may be interpreted as an indicator for a road, namely the shortest possible path between the Eastern Transylvania and the Danube. A separate analysis of the main segments could be useful for a better understanding of the above interpretation. First, there is the notorious Tabla Buții Road. It appeared for the first time in documents in 1421 (Rachieru 1986, p. 56) being well known as a main route passing the mountains in medieval and modern times (Cruceru, Buterez 2012) but the road was intensly used in Roman times (Țentea, Matei-Popescu 2015) and highly probable also in the 2nd half of the 1st millennium AD (Ciupercă 2010). There is no doubt the road had the same importance even in older ages. At least for the Second Iron Age we should note findings from this period up on ridge of the mountains in the late medieval fortress of Tabla Buții (Căpățână et al 2008) but also the very instalment of the Roman military camp at Drajna de Sus in the context of the first Roman-Dacian war (Florescu 1968).

We should not go further before a brief note of the great hillfort on the Homărâciu peak. Assessing the chosen place and archaeological finds (Petrescu-Sava, Nestor 1940) this should be interpreted as the most important central place in the Classical Dacian period in the whole area of Teleajen River basin. Being so, we won't fail to notice the offset of the placement out of the main road to the west. This hint alone is enough to search other connections in the area. Thus, we have to add the control of the valuable resources of salt, chiefly those on Slănic Valley, but many possible others on Teișani and Vitioara salted areas. We may add the other roads in a distribution network linking the salt exploitation areas, not just those nearby but further to the west where other salt areas are known (for example Telega on Doftana River basin), with the main Tabla Buții Road.

The end of the Tabla Buții Road should be somewhere south to the Gura Vitioarei and Făgetu pair of hillforts guarding both sides of Teleajen River or even immediately south to the summit between the Vărbilău River and Teleajen River. From here the southern connections with the Tabla Buții Road were likely numerous, while from the interface between hills and the plain the traveling effort is considerable lower. As it was already stated one possible continuation of the road could have been straight to the south. It is first and foremost the well-known Tinosu Dacian central place (Vulpe 1942) but also other significant settlements and Dacian sites that are suggesting this. This leaves room for various hypotheses in favour of a logical distribution of salt controlled by Dacians south to the Danube, where salt resources are missing. However, a detailed analysis of the roads network from the Second Iron Age exceeds the scope of the present paper and will be better to explore the subject in a future work.

Our present view on the topic of the salt control and distribution in the southern part of Eastern Carpathians in the prehistory in general and in the Second Iron Age in particular is rather sketchy. New researches in the area are required in order to firmly support the above discussed assumptions. Even if the Dacians hillfort raised on the edge of the Slănic salt area is forever lost, there are still remaining other important sites to investigate. Among these we note the numerous springs and valleys with salt water but also some of the large fortified settlements, like the pair guarding the Teleajen River on Făget and Gura Vitioarei, both of them close to another important salt area used in the Early Modern period period. Of special importance would be a new research project on the fortified site placed on top of the 'Cetățuia hill' from Homoraciu, most likely the dominant central place, able to manage mineral resources in the area and to drive all the medium and long distance commercial and exchange activities.

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References

Babeș, M. 2010. Dinamica culturii geto-dacice 'clasice'. In M. Petrescu-Dîmbovița and A. Vulpe (eds.). *Istoria Românilor. Moștenirea timpurilor îndepărtate* I: 805-809. București.

Brătescu, P., Moruzi, I. and Alessandrescu, C. 1897. *Dicționar geografic al Județului Prahova*. Viitorul, Târgoviște.

Cavruc, V. 2015. The Archaeological Evidence for Salt Production in Romania. In Ș. Caliniuc, M. Asăndulesei, R.-G, Curcă, and M.-T. Alexianu. *First International Congress on the Anthropology of Salt*: 29-32. Iași.

Cavruc, V., Chiricescu, A. 2006. *Sarea, timpul* și *omul. Catalog de expoziție*. Sf. Gheorghe, Angustia.

Căpățână, D., Teodor, E.S., Ioniță, A., Ciupercă, B. Bădescu 2008. Cetatea de la Table Buții (com. Cerașu, jud. Prahova) – campaniile arheologice 1995-1996, 1998. *Materiale și cercetări arheologice* 4.

Ciobanu, D. 2006. Exploatarea sării în evul mediu în Țara Românească. In V. Kavruk and A. Chiricescu (eds.) *Sarea, timpul și Omul*: 122-124. Sf. Gheorghe, Ed. Angustia.

Ciupercă, B. 2010. Some observations from the point of view of the Slon fortifications about power centres in the Lower Danube between the eighth and tenth centuries. In A. Paroh, S. Rossignol, B. Sz. Szmoniewski and G. Vercamer (eds.), *Potestas et communitas. Interdisciplinary Studies of the Constitution and Demonstration of Power Relations in the Middle Ages East of the Elbe: 275-290.* Wroclaw, Warszsawa.

Comşa, M. 1981. Cetatea de lemn din secolele VIII-IX de la Slon-Prahova. In *Muzeul Naţional* 5: 133-136.

Comşa, M. 1983. Raport preliminar asupra săpăturilor executate la Slon. In *Materiale* şi *Cercetări Arheologice* 15: 437-43.

Florescu, G. 1968. Problema castrelor romane de la Mălăieşti, Drajna de Sus şi Pietroasa. In *Studii* şi *comunicări, Satu-Mare* 1: 31-39.

Ganciu, A. and Măndescu, D. 2013. A getic grave with gold earring from Zimnicea – 'Câmpul Morţilor' necropolis. *Thraco-Dacica Serie Nouă* 4, 5: 53-62.

Glodariu, I. 1983. *Arhitectura dacilor: civilă și militară (sec. II î.e.n.-I e.n.)*. Bucharest, Dacia.

Harding, A. and Kavruk, V. (Eds.). 2013a. *Explorations in salt archaeology in the Carpathian Zone*. Budapest, Archaeolingua Alapítvány.

Harding, A. and Kavruk, V. 2013b. Transylvania. In A. Harding, V. Kavruk (eds.). *Explorations in salt archaeology in the Carpathian Zone:* 41-154. Budapest, Archaeolingua Alapítvány.

Petrescu-Dâmbovița, M. and Sanie, S. 1972. Cercetări arheologice în așezarea geto-dacică de la Ciolănești din Deal (jud. Teleorman). In *Arheologia Moldovei* VII: 241-258.

Petrescu-Sava, G., and Nestor, I. 1940. Două localități preistorice pe Teleajen: Cetățuia de la Homorîci și Movila de la Gura-Vitioarei (jud. Prahova). *Revista de Preistorie* Şi *Antichităţi Naţionale* 2, 4: 71–88.

Rachieru, M. 1986. Drumul Teleajenului sau calea Vălenilor. *Anuarul Muzeului Județean de Istorie și Arheologie Prahova. Studii și cercetări* II: 55-62.

Ștefan, D. and Ștefan, M.-M. 2018. Remote sensing for mountain archaeology in the Curvature Carpathians. The fortifications around Crai Summit.In *Istros 24*. Istros, Brăila.

Teodorescu, V. 1981. *File din istoria județului, în Județele patriei – Prahova*. București, Editura Sport-Turism.

Tocilescu, G. 1900. *Fouilles et recherches archéologiques en Roumanie*. Bucharest.

Țentea, O. and Matei-Popescu, F. 2015. Why there? The preliminaries of constructing the Roman Frontier in South-East Dacia. *Acta Musei Napocensis* 52.

Vulpe, R. 1942. Les fouilles de Tinosul, *Dacia* 1: 166-223.

Vulpe, R. and Teodor, S., 2003. Piroborodava. Așezarea geto-dacică de la Poiana. *Bibliotheca Thracologica* 39.

Yotov, V. 2012. Bulgarian control over the Salt Road in Transylvania during the 9th century: The archaeological evidence. In V. Nikolov and K. Bacvarov (eds). *Salz und Gold: die Rolle des Salzes im prähistorischen Europa / Salt and Gold: The Role of Salt in Prehistoric Europe*: 323-331. Provadia & Veliko Tarnovo.

Geophysical Prospections in the Area of the Salt Mine at Sânpaul

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Abstract

The literature abounds in affirmations of the fact that Roman Dacia was rich in salt. Nevertheless, we can observe that, as far as archaeological research is concerned, 'Salt' in Roman Dacia is an object of study that generats mostly 'logical clues' rather than archaeological facts or reliable sources. Salt deposits with traces of exploitation that can be undoubtedly assigned to the Roman Period, tools, paleo-chemical traces of salt, written sources upon salt extraction, trade and traffic/transportation – such information is not known to modern research. The main pieces of information related to salt in eastern Roman Dacia are generated by epigraphy. The most important inscription mentions a *conductor* of the salt mine.

The presumed Roman age salt mine from Sânpaul is found south - south-east of the locality with the same name, in Harghita County, Romania. The area is part of the Transylvanian sub-Carpathians. In order to verify the existence of a salt mine, we decided to conduct a series of geomagnetic prospections of the area of the brine spring, specifically in the area where one could discern traces of some edifices belonging to the mine's infrastructure. The evaluation of the first results of magnetometric measurements conducted at '*The salt mine from Sânpaul*' allows us to formulate the hypothesis that the site is very rich in magnetic anomalies, which could be, at least partially, the result of anthropogenic activities. Expansion of the research to a wider area around the surface marked by saline efflorescence and halophile plants could offer more information on possible underground structures.

Keywords: Eastern Transylvania, Roman Province Dacia, salt extraction, magnetometric prospection, Roman frontiers.

Introduction

The importance of solid salt in the life of humans and their environment is a much discussed subject in specialised literature.[1] Since antiquity humans have been preoccupied with ensuring their continuous access to this vital substance.[2] As time passed, salt became one of the basic elements of the economy of the ancient world, as well as a much-disputed element among different social groups. Ever since the first contacts between Dacia and Rome, salt was probably an important component of the relationships between these two entities of the ancient world. Once it became a component of the empire, Dacia became well-known and asked for, not only for its important gold reserves[3] but also for those of salt (Gudea/Lobüscher 2006, 44). There are a number of rock-salt mining sites in Dacia Province, which are often mentioned in the archaeological literature, such as: Ocna Mureş (*Salinae*), Domneşti, Homorod, Rogna, Ocna Dejului, Sic, Cojocna, Ocna Sibiului, Ocnele Mari.[4] The salt mine from Sânpaul, which is the subject of this short study, is also mentioned among these.[5]

The geographic and geological background

Sânpaul is a locality in Harghita County, found in the Homorodul Mare river valley (Figure 1), in the Homoroade depression (Morariu 1969: 30). From a geographical point of view, the area is part of the Transylvanian Sub-Carpathians or of one of their subunits – the Odorhei and Homroade Sub-Carpathians (Mac 1987: 595 Figure 206). This geographical unit is bordered on its long side by the Vârghiș Mountains and is characterised by the Neogene corrugation of their south-eastern part (Mac 1987: 602). The rock composition is dominated by marls, sands and conglomerates, as well as by thin horizons of volcanic turfs, all of Mio-Pliocene age. The large rock salt deposits found in the depressions are tied to these structures (Mac 1987: 596), thus the locality is found in a salt-rich area. Upstream, one can find Comăneşti (Chiricescu 2013: 295 Pl. 5, 74) and Mărtiniş (Chiricescu 2013: 295 Pl. 5, 75-76), while downstream the closest known salt sources are found in Rupea (Chiricescu 2013: 295 Pl. 5. 87) and Ungra (Wollmann 1996: 244 şi Nota 28).

[1] For Romanian literature see, for example, Cavruc/Chiricescu 2006 as well as Alexianu et al. 2015. - Alexianu et al. 2011.

[2] For the natural and artificial salt sources known in Greek-Roman antiquity, see Humphrey et al. 1999.

[3] Usually, literature mentions the II 28 passage of De Magistratibus by Joannes Lydus. For comments issued in Romanian literature see, for example, Rădulescu/Petolescu 2010, 745 or Babeş et al. 2010, 819.

[4] For a list of sites with shallow rock salt deposits see Rustoiu 2005, 276-278 Anexa 1. To be compared with Macrea 1969, 306-307; Wollmann 1996, 241-247; Bărbulescu 2005, 76; Protase/Suceveanu 2010, 183.

[5] In the publication of Vasile Boroneanţ upon the Romanian caves and mines the site from Sânpaul is located in Cluj County – Boroneanţ 2000, 153.

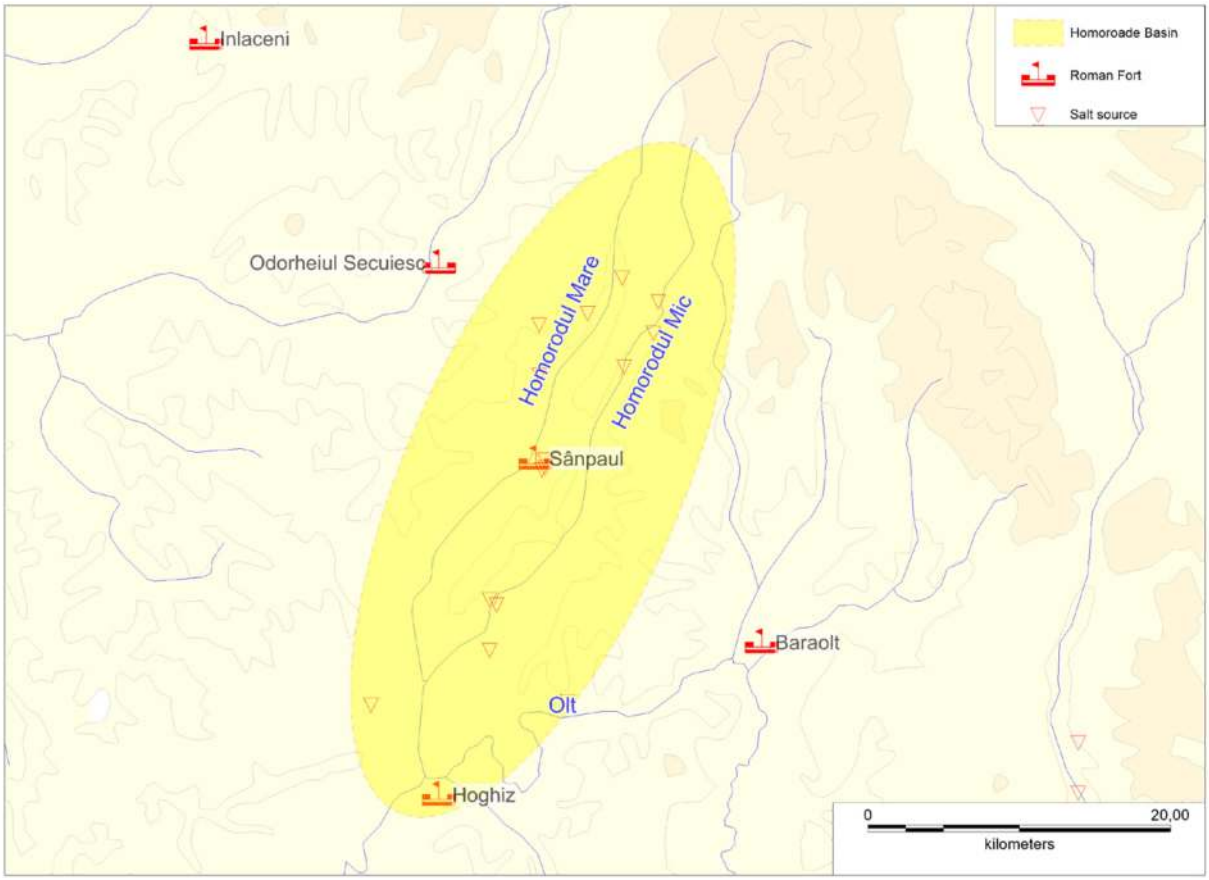

Figure 1. Sânpaul. The location of the site in the Homoroade Basin.

The history of research

Several Roman sites are known nearby Sânpaul (Cavruc 2000: 137. XXIV j, 2-4). There is a fortification with an inner wall, an open (civilian) settlement, as well as a site found nearby a presumed salt mine south of Sânpaul. In older literature these discoveries appear also under the name of Păuleni (Daicoviciu 1941: 319-320). The fortification with an inner wall was found in the north side of the village, between the Unitarian Church and the brook called by locals 'the Castle brook'. Older literature mentions that the ruins served as a rock source for building many of the properties nearby. Orbán was the first to presume the existence of a Roman camp at Sânpaul (Orbán 1868: 165), opinion which was confirmed by the visit of Paulovics during the Second World War (Paulovics 1944: 53-59). Rescue archaeological digs conducted between 1957 and 1958 revealed an entire series of Roman evidence, including traces of the inner wall (Ferenczi/Ferenczi 1960). The site caught the attention of specialists mostly due to the inscriptions revealed there (Russu 1988: 193-199). The most important inscription mentions a *conductor* of the salt mine (for a bibliography see Mihăilescu-Bîrliba 2016). Some historical and archaeological issues related to the Roman site from Sânpaul were tackled in other publications as well, either specialized (for example, Timoc 2000) or general ones (Wollmann 1996: 244. Gudea 1997: 61 Nr. 37. Cavruc/Chiricescu 2006: 54. Benea 2007).

Salt exploitation at Sânpaul

The archaeological site where it is presumed that salt was extracted in the Roman Period became known in specialised literature under the name of 'Sânpaul. *Minele romane*' [*Roman mines*] (Cavruc 2000: 137. XXIV j, 2-3). The site is found at about 1,5 km south – south-east of the village, on the right side of the road to Ocland (Figure 2.C), in the place called by natives '*The brine well*', or '*the place where romans exploited salt*' (Russu 1988: 195). Over time, different items were collected in this area, such as coins, pottery fragments and a votive altar. This item was discovered in the autumn of 1927 and is kept today at the National Szekler Museum in Sfântu Gheorghe. It is a votive altar made of limestone, with the dimensions of 94 x 49 x 43 cm (Figure 3).[6]

[6] For the description of the item see especially Russu 1988: 195-196 Nr. 248.

Figure 2. Sânpaul. The outline of the area around the 'Salt mine'.
A-B – brine wells covered with a house; C – salt water (brine) spring;
1 – 3 geomagnetic measurement grids.

Figure 3. Sânpaul. Votive altar (after Russu 1988, 195).

In the area today we can still find two brine wells (Chiricescu 2013: 218-219) (Figure 2.A-B) and a salt-water spring, neither properly marked but evident from saline efflorescence and halophile plants, as well as by many fragments of volcanic turfs (Figure 4). Besides these, at the surface one could observe a series of wooden pillars placed deep in the ground. The pillars were about 50 cm high above the surface. Some of them had a diameter of about 40 cm. The pillars seem to be arranged on two sides of a small ravine, a fact that allowed the birth of the hypothesis that these could indicate the place where the entrance into the mine once was found (Figure 5).[7]

Geomagnetic prospections

In order to verify the existence of a salt mine near the brine spring, we decided to conduct a series of geomagnetic prospections of the area above the presumed entrance into the salt mine, in the area where there were possible traces of some edifices belonging to the mine's infrastructure (Figure 2.1-3). The field-research method was based on using an installation composed of 5 'Fluxgate' sensors. This type of magnetometric sensor measures the vertical composition of the magnetic field, with an error margin of about 0,1-0,5 nT. These were fixed on a mobile, non-magnetic frame. The distance between the sensors was 0,50 m, thus the measurements were

Figure 4. Sânpaul. Brine spring (photo by Andrea Chiricescu).

[7] See the description of this situation in Chiricescu 2013: 220.

Figure 5. Sânpaul. Wooden pillars at the surface, nearby the brine spring (photo by Andrea Chiricescu).

conducted in 2,50 m wide strips. The distance between the measured points by each sensor was 0,05 m. The in-depth penetration power depends on several factors, but mostly on the dimensions of the objects researched or sought, thus strong anomalies can be distinguished relatively deep underground. The magnetometric mapping was done in rectangular grids. Their position in absolute coordinates was determined with a geodesic GPS. By using the ROMPOS real time correction system we obtained a precision that oscillated between 0,02-0,04 m. The acquired topographic data were stored in the Romanian national projection system 'Stereo 70'. The data acquired with the help of the magnetometric equipment were processed by interpolation and were compensated through the median filter algorithm. The results of data interpolation were represented in the shape of greyscale plans. The small values that correspond to a lower magnetisation of the researched surface are represented in lighter colour tones, while the higher ones are of darker colour.

To meet the objectives of our research we have investigated so far three grids. Each grid, its dimensions and configuration, was adapted to the configuration of the terrain (Figure 6.1-3).

Perimeter 1 covers a surface of 54 x 50 m. Its positioning within the landscape was determined by our intention to get as close as possible to the place where the presumed salt mine was located. The interpolated image based on the measurement of this perimeter indicates the presence of several anomalies only on its southern edge, on the slope that rises towards the brook's first terrace. The second perimeter covered a surface of 54 x 24,5 m. It was partially connected to the first perimeter's southern edge. The positions of the magnetic anomalies does not allow us to identify any underground archaeological structures. Perimeter 3 was partially connected to the southern edge of perimeter 2, covering a surface of 120 x 60 m. The interpolation of the values measured with the magnetometer indicates the presence of several magnetic anomalies, but we cannot identify, based on these, traces of presumed underground archaeological structures, masonry or other such works.

The evaluation of the first results of magnetometric measurements conducted at 'The salt mine from Sânpaul' allows us to formulate the hypothesis that the site is very rich in magnetic anomalies, which could be, at least partially, the result of anthropogenic activities. Extending the investigations to a wider area around the surface marked by saline efflorescence and halophile plants could offer more information on possible underground structures.

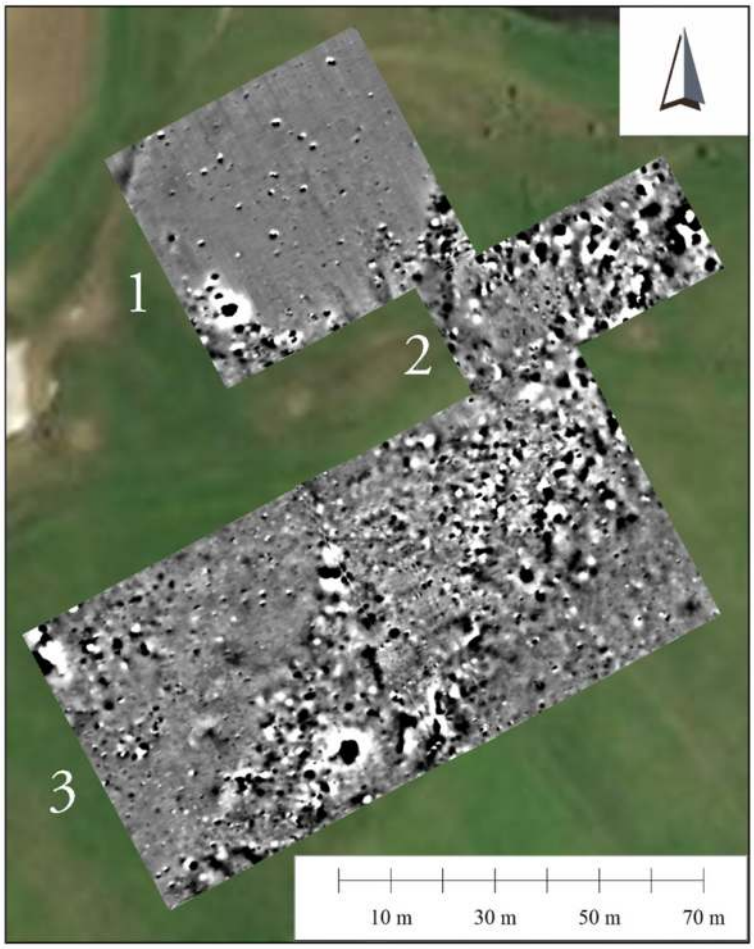

Figure 6. The results of the geomagnetic prospection.

Some remarks about Salt vs. Limes in the Eastern Part of the Roman Province Dacia

The literature abounds in affirmations that Roman Dacia was rich in salt. Nevertheless, we can observe that, as far as archaeological research is concerned, 'Salt' in Roman Dacia is an object of study that generates mostly 'logical clues' rather than archaeological facts or reliable sources. Salt deposits with traces of exploitation that can be undoubtedly assigned to the Roman Period, tools, paleo-chemical traces of salt, written sources upon salt extraction, trade and traffic/ transportation – such information is not known to modern research. The main pieces of information related to salt in eastern Roman Dacia are generated by epigraphy (inscriptions regarding people involved in entrepreneurship activities in the field of salt exploitation). Direct indications available for study are offered by such fields as geography (by locating the salt deposits) and historic geography (toponyms of Latin origin, designating salt sources). Nevertheless, based merely on epigraphic sources, we can reach, without great difficulty, the conclusion that salt represented quite a valuable resource for the economy of the Roman Province Dacia. In order for salt to reach the final consumer, extraction and trade were assigned to tenants, who organised the work with the help of specialised personnel. Based on these sources, as well as on similar ones that come from the western part of Dacia Province, recent research has issued a hypothesis suggesting that the Roman state only 'mediated' in the activities of salt extraction in Dacia. According to this idea, the activity of Roman salt mines in Dacia cannot be conceived without the intermediate chain represented by the civilian '*conductores*' – whether we speak about tenants as individuals or tenant associations/ societies. The state controlled the salt resources only indirectly, meaning that it was only involved at a minimal scale in the administration of the salt mines (Mihăilescu-Bîrliba 2016. See also Tsigarida 2012). Under these circumstances, we ask ourselves whether, in a militarised Roman Province such as Dacia, the salt extraction and distribution mechanism could have worked without the direct intervention of the Roman army. Doina Benea considers that this is an impossible situation, since '*... the army appears directly involved in the exploitation of salt sources... All the inscriptions mention the involvement of the army in civilian commercial activities, whether for protecting these, or for self-catering. This fact catches our attention, since it is possible that we deal with a military supervision of the salt exploitations, such as in the case of the gold mines*' (Benea 2007, 41-42).

At first sight this answer seems quite credible. The spatial distribution of the above mentioned sites shows that the majority of salt mines and salt sources close to the surface found in eastern Roman Dacia are close to a Roman fortification: Domnești – Jelna are close to the Orheiul Bistriței Roman Camp (Gudea 1997: 55-56 Nr. 31. See also Protase 2008), Sovata and Praid are found between the fortifications from Sărăţeni (Gudea 1997: 58-59 Nr. 34) and Inlănceni (Gudea 1997: 59-60 Nr. 35. See also Popa u. a. 2010). The Sânpaul and Mărtiniș salt mines are close to the camp at Sânpaul (Gudea 1997: 61 Nr. 37). And next to the presumed salt mine at Ungra we can find the well-documented camp at Hoghiz (Gudea 1997: 66-67 Nr. 43). Thus, it is quite easy to create the impression that these camps were not established to protect the Province, but their position was chosen rather based on their closeness to the salt sources! According to my own opinion, a possible explanation

is hidden by the way we look at the structure of the Roman frontiers in Dacia.

The general concept upon the borders of Roman Province Dacia is significantly different of the linear fortifications system found on the Danube and the Rhine. One of the main differences is in the special spatial disposal of the auxiliary camps, which, in the eastern part of the Province, are placed in the valleys facing the gorges over the Carpathians. This design of the Dacian border was 'baptised' in older literature using the German term '*Talsperre*' (Domaszewski 1893: 242). Used in this context, '*Talsperre*' means blocking access from the gorges towards the centre of the Province (For more details see Popa 2015). Although it has been promoted by renowned precursors of Roman antiquity research, this model is not generally applicable for entire Dacia Province, not even for eastern Dacia in particular. The archaeological reality shows that, on the one hand, there are still valleys facing gorges over the Carpathians in which there are no Roman fortifications discovered so far. On the other hand, we know fortifications in Roman Dacia that do not follow the same principle of '*Talsperre*'.[8] The inner arrangement of the aforementioned structures should play an important role in explaining the organization of the Roman frontiers in Dacia, although the extent to which these fortifications, presumably 'roman camps', were researched is still at its beginning. We do not know the entire inner compartmentation of any of these structures yet. Based on the visible (or presumed) shape of the fortification system, they were defined to be 'camps', meaning the place where military troops were dispatched, empowered with protecting the border against the barbaricum. In none of these cases has one supposed that these could represent civilian sites, fortified following the military model, but with a different inner structure, without the *retentura* or *praetentura* to be exclusively covered with barracks for soldiers. The example of the Waldgirmes site in Germany offers us an eloquent analogy for this type of situation (Becker u. a. 2015). In my opinion, these fortifications were built consciously in the area in which we find, even today, important salt sources, but it is not necessarily true that they have played a role of defending the eastern border of Dacia. With the same success, they could have played the role of civilian centres for organising the economic activities in this part of the Province. The fact that their fortification was made according to the rigours of the Roman military architecture cannot, and should not, be an impediment in defining some of them as possible civilian centres in the eastern part of Roman Dacia. We do have to mention the fact that in this part of Roman Dacia there are no civilian settlements or *villae* known so far (Bărbulescu 2005).

[8] See, for example, the fortified site at Comolău - Popa/Bordi 2016.

Dacia was conquered, retained and finally abandoned for military and strategic reasons. It was a military province and the role of the army was decisive. But, at least until we get to know the inner structure of these fortifications, we cannot exclude the possibility that some of them might have been centres of economic organisation of the region rather than camps for auxiliary troops on the eastern border of Dacia. In the case of the (presumed) fortified site at Sânpaul, we can assume that it was built and it evolved over time due to the salt-rich area of the Homoroade Valley, being placed right in the middle of this region.

References

Alexianu, M., Weller, O. and Curcă, R-G. (eds.) 2011. *Archaeology and Anthropology of Salt: A diachronic Approch. Proceedings of the International Colloquium, 1-5 October 2008, Al.I. Cuza University (Iaşi, România).* British Archaeological Reports, International Series 2198, Oxford, Archaeopress.

Alexianu, M., Curcă, R-G., and Cotiugă, V. 2015. (eds), *Salt Effect. Second Arheoinvest Symposium: From the ethnoarchaeology to the anthropology of salt.* British Archaeological Reports, International Series 2760, Oxford, Archaeopress.

Babeş, M., Glodariu, I., Isvoranu, T. and Vîlcu, A. 2010. Civilizaţia geto-dacă din a doua jumătate a secolului al II-lea a.Chr. până la începutul secolului al II-lea p.Chr. In M. Petrescu-Dîmboviţa and A. Vulpe (Hrsg.), *Istoria Românilor. Vol. 1. Moştenirea timpurilor îndepărtate* 2nd edition: 757-843, Bucureşti, Editura Academiei Române.

Bărbulescu, M. (Hrsg.) 2005. *Atlas-Dicţionar al Daciei Romane*. Publicaţiile Institutului de Studii Clasice 6, Cluj-Napoca.

Becker, A., Baatz, D., Ehmig, U., Gluhak, T-M., Hecht, S., Helfert, M., Schnurbein, S-V., Scholz, M., Thiemeyer, H., Völlmecke, Y., Vogt, R., Westphal, T., Wigg-Wolf, D., Rasbach, G., and Baatz, D. 2015. Waldgirmes: die Ausgrabungen in der spätaugusteischen Siedlung von Lahnau-Waldgirmes (1993-2009). I, Befunde und Funde. Römisch-germanische Forschungen, Darmstadt.

Benea, D. 2007. Cu privire la administrarea salinelor din Dacia romană. *Analele Banatului XV:* 41-46.

Boroneanţ, V. 2000. *Arheologia peşterilor şi minelor din România*, Bucureşti.

Cavruc, V. 2000. *Repertoriul arheologic al judeţului Harghita. Monografii arheologice*. Sf. Gheorghe, Angvstia.

Cavruc, V. and Chiricescu, A. (eds.) 2006. *Sarea, Timpul şi Omul*. Sfântu Gheorghe, Angvstia.

Chiricescu, A. 2013. *Civilizaţia tradiţională a sării în estul Transilvaniei: raport de cercetare*. Sfântu Gheorghe, Angvstia.

Daicoviciu, D. 1941. Neue Mitteilungen aus Dacien. In *Dacia 7-8 (1937-1940)*: 299-336.

Domaszewski, A.-V. 1893. Zur Geschichte der römischen Provinzialverwaltung. In *Rheinisches Museum für Philologie*. N. F 48: 240-247.

Ferenczi, G. and Ferenczi, I. 1960. Săpăturile de salvare din 1957-1958 de la Sînpaul. *Materiale şi Cercetări Arheologice VII:* 401-405.

Gudea, N. 1997. Der dakische Limes. Materialien zu seiner Geschichte. Jahrbuch des Römisch Germanischen Zentralmuseums Mainz 44, 2: 497-609.

Gudea, N. and Lobüscher T. 2006. Dacia. Eine römische Provinz zwischen Karpaten und Schwarzem Meer. Zaberns Bildbände zur Archäologie. Sonderbände der Antiken Welt, Mainz.

Humphrey, J. W., Sherwood, A. N. and Oleson, J. P. 1999. *Greek and Roman technology : A sourcebook. Annotated translations of Greek and Latin texts and documents Repr. d. Ausg* London/New York.

Mac, I. 1987. Subcarpaţii Transilvaniei. In Oancea, D. and Velcea, V. (eds.) 1987, *Geografia României III. Carpaţii Româneşti şi Depresiunea Transilvaniei:* 594-603, Bucureşti.

Macrea, M. 1969. *Viaţa în Dacia Romană*, Bucureşti.

Mihăilescu – Bîrliba, L. 2016. Les salines en Dacie romaine: remarques sur le personnel administratif. *Studia Antiqua et Archaeologica* 22, 1: 51-58.

Morariu 1969. *Geographie Rumäniens*. Bukarest.

Orbán, B. 1868. *A Székelyföld leírása történelmi, régészeti, természetrajzi s népismei szempontból*. I. Udvarhelyszék, Pest.

Paulovics, I. 1944. *Dácia keleti határvonala és az úgynevezett 'dák' ezüst kincsek kérdése.* Kolozsvár.

Popa, A. 2015. Castrul roman de la Baraolt? Contribuţii la repertoriul arheologic al judeţului Covasna. *Angustia* 19: 163-174.

Popa, A., Cociş, S., Klein, C., Gaiu, C. and Man, N. 2010. Geophysikalische Prospektionen in Ostsiebenbürgen. Ein deutsch-rümänisch-moldauisches Forschungsprojekt an der Ostgrenze der römischen Provinz Dacia. *Ephemeris Napocensis* 20: 101-128. Cluj.

Popa, A. and Bordi, Z .L. 2016. Studii asupra graniţelor romane din Dacia. Fortificaţia de la Comolău. *Studii şi Cercetări asupra frontierelor Imperiului Roman de pe teritoriul României* 1, Cluj-Napoca.

Protase, D. 2008. *Castrul roman de la Orheiul Bistriţei*, Cluj-Napoca.

Protase, D. and Suceveanu, A. (eds.) 2010. *Istoria Românilor II. Daco-romani, romanici, alogeni*. Bucureşti.

Rădulescu, A. and Petolescu, C. C. 2010. Istoria Daciei de la Burebista până la cucerirea romană. In M. Petrescu-Dîmboviţa and A. Vulpe (eds.), *Istoria Românilor*. 1: 687-755, Bucureşti.

Russu, I. I. 1988. Dacia Superior (zona răsăriteană). *Inscripţiile Daciei Romane III/4.* Bucureşti.

Rustoiu, G. T. 2005. Exploatarea sării şi habitatul uman în Transilvania în a doua jumătate a secolului V şi prima jumătate a secolului VI p.Chr. In C. Cosma and A. Rustoiu (eds.), *Comerţ şi Civilizaţie. Transilvania în contextul schimburilor comerciale şi culturale în antichitate*: 269-293. Cluj-Napoca.

Timoc, C. 2000. Despre castrul şi vicus-ul militar de la Sânpaul (jud. Harghita). *Apulum* 37, 1: 397-399.

Tsigarida, I. 2012. Bereiche der zentralen Einflussnahme auf Salz im Römischen Reich am Beispiel der Provinz Dakien. Akten der internationaler Fachtagung (Humboldt-Kolleg) in Provadia, Bulgarien, 30 Spetember - 4 Oktober 2010. In V. Nikolov and K. Bacvarov (eds.), *Salz und Gold: die Rolle des Salzes im prähistorischen Europa:* 313-322. Provadia, Velika Tarnovo.

Wollmann, V. 1996. Mineritul metalifer, extragerea sării şi carierele de piatră in Dacia romană. Der Erzbergbau, die Salzgewinnung und die Steinbrüche im römischen Dakien. *Bibliotheca Musei Napocensis* 13. Bucureşti.

Salt Production as a Reflection of Inter-Ethnic Contact and Culture Change during Late Prehistory (AD 800-1100) in South Alabama, United States

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Abstract[1]

Despite the wide distribution of salines throughout eastern North America, the Alabama salines are the only ones in the eastern Gulf Coastal plain. Thus, Alabama salines provided salt for thousands of prehistoric and early historic peoples. The prehistoric components of these sites reflect a major cultural transition between horticultural Late Woodland populations (AD 400-1100) and the agricultural chiefdoms of the Mississippian culture (AD 1100-1550) that followed. It is likely that salt production itself was the reason for this change. Archaeological evidence suggests that Late Woodland people of the Tombigbee River Valley, known archaeologically as the McLeod culture, began to manufacture salt around AD 800. At the Lower Salt Works salines, a dense layer of McLeod-style pottery is the earliest evidence for use of the site. Analysis of features and pottery reveals that salt was made by boiling brine directly over a fire in small bowls. Unlike typical coiled bowls from McLeod villages, bowls at salines were made by pinching clay into the desired form. This technique suggests an expedient, casual manufacture of salt by McLeod people, who, in the absence of any exotic trade items at McLeod salines or villages, seem to have been consuming it themselves. McLeod use of the salines ended abruptly around AD 1100. Directly overlaying McLeod artifacts at several saline sites is a layer with Mississippian culture artifacts attributable to a large chiefdom located over 400km away. There is no evidence for in situ development of Mississippian culture from McLeod; Mississippians simply displaced McLeod people from the salines. Mississippian layers have an abundance of fragments of large, shallow ceramic basins, called 'saltpans,' that, according to ethnohistoric sources, were used in the solar concentration of brine before boiling it in jars, a marked change in technology designed to produce large quantities of salt. Evolving methods of manufacturing saltpans reveal a production process that became increasingly refined and specialized. Mississippian salt specialists returned with salt to their home chiefdom, where elites likely controlled its distribution and trade. Within a few generations, the McLeod people were no longer in the region, completely displaced or absorbed by the Mississippians, a significant cultural shift originating with a shift in the desire for salt.

Keywords: horticulture, agriculture, salines, saltpans, Moundville, Bottle Creek.

Human desire for salt has motivated us to travel long distances to acquire it, invent new technologies or adapt existing ones to make it, pay high prices to buy it, and, sometimes, push others aside to control it. Like elsewhere in the world, all of these actions were taken by Native Americans in the forests and swamps of the deep Southeast in their own quests for salt. In southwest Alabama, salt production by people who lived near salt springs made them an attractive target for a powerful foreign ethnic group. These powerful newcomers displaced the locals and introduced a new methodology for making large quantities of salt. Their legacy was the development of a new chiefdom in the region, whose power was based in part on their ability to control the salt trade.

Two large rivers—the Tombigbee and Alabama—cut through the landscape of south Alabama in wide floodplains before meandering into the Mobile-Tensaw Delta, which eventually empties into Mobile Bay and the Gulf of Mexico, 113km to the south (Figure 1). Within the floodplain of the lower Tombigbee are dozens of salt springs that flow from deeply buried connate water. The region has a humid subtropical climate with no distinct dry season, so the swamps and floodplains are ecologically diverse, rich environments with a high carrying capacity for human life. The landscape has supported a relatively dense population since humans first wandered in around 13,000 years ago, and it is difficult to find an archaeological site that does not have multiple occupations spanning thousands of years. Hunting, gathering, and small-scale horticultural lifestyles might have persisted into the post-contact era had it not been for the salt springs and the social change that they stimulated.

At the Lower Salt Works site, low hills surround a salt flat created by at least four springs. Each of the hills has been significantly disturbed by nineteenth-century salt production activities, but by excavating on the slopes

[1] Portions of this paper appear in Dumas, Ashley A. and Paul N. Eubanks (2021) Salt in Eastern North America and the Caribbean : History and Archaeology. University of Alabama Press, Tuscaloosa.

of the hills, intact stratigraphy was isolated. The strata there represent successive layers of midden that were thrown or scraped off the production areas at the top of the hill. For that reason, we expected to find the refuse associated with salt production but no intact features. Small tests indicated that the midden deposits were extremely dense with pottery, thus in consideration of time and limited resources, we decided to excavate only a 1m x 2m unit.

The earliest layer (E) at the Lower Salt Works contained artifacts dating to the Late Woodland period (AD 600-1100) (Figure 2). Charcoal from a pit in the base of the layer yielded a radiocarbon date of cal. AD 680-900. Late Woodland cultures in this region are referred to by archaeologists as the McLeod culture. The artifacts from Layer E were typical of Late Woodland McLeod domestic assemblages found at village sites elsewhere in the lower Tombigbee River valley: vessels made with clay coils and sand temper; more jars than bowls; vessels stamped with a checked pattern; and small triangular arrow points. McLeod villages and camp sites are dense throughout the lower Tombigbee Valley and have been found on the ridges and levees near the salines, so it was not surprising to find a McLeod occupation at the Lower Salt Works. The assumption is that McLeod people had established small camps at the salines to hunt for deer and other game on the salt flats.

More interesting, however, was a layer directly overlying this McLeod assemblage that contained a huge amount of atypical McLeod pottery. From Layer D we recovered 1005 McLeod potsherds and a 9:1 ratio of bowls to jars. This is the reverse of the bowl-to-jar ratio found at domestic village sites. There is a minimum of 234 bowls represented within this 20cm thick layer. The bowls were slab-molded, or press-molded (instead of coiled), in an almost haphazard manner that resulted in widely varying vessel thicknesses, sloppy rim folds, and irregular diameters averaging 25cm, significantly larger than bowls at domestic sites (Figure 3A). It also increased the occurrence of exterior surfaces spalling off, probably due to heat, and the remaining exterior surfaces are often coated with soot. The usually smooth surfaces of the interiors appear to be scraped away. The majority of the bowls were line-stamped instead of bearing the checked pattern generally more common for this period. These line-stamped, mass molded shallow bowls are the only ones like this in the entire region, and they represent an extraordinary break from a 1000 year-old tradition of making coiled, sand tempered pots.

Also within Layer D were two stacks of limestone rocks that showed grey to reddish discolorations suggestive of their placement within or near a fire. Charcoal from within one of the stacks yielded a date of c. 880-1030 AD. A dense cluster of potsherds contained at least six broken, shallow bowls. It cannot be unequivocally stated that clusters of broken bowls represent in situ salt production features. They might also be described as discrete piles of refuse that had been cleaned off of the activity area on top of the hill and dumped out of a

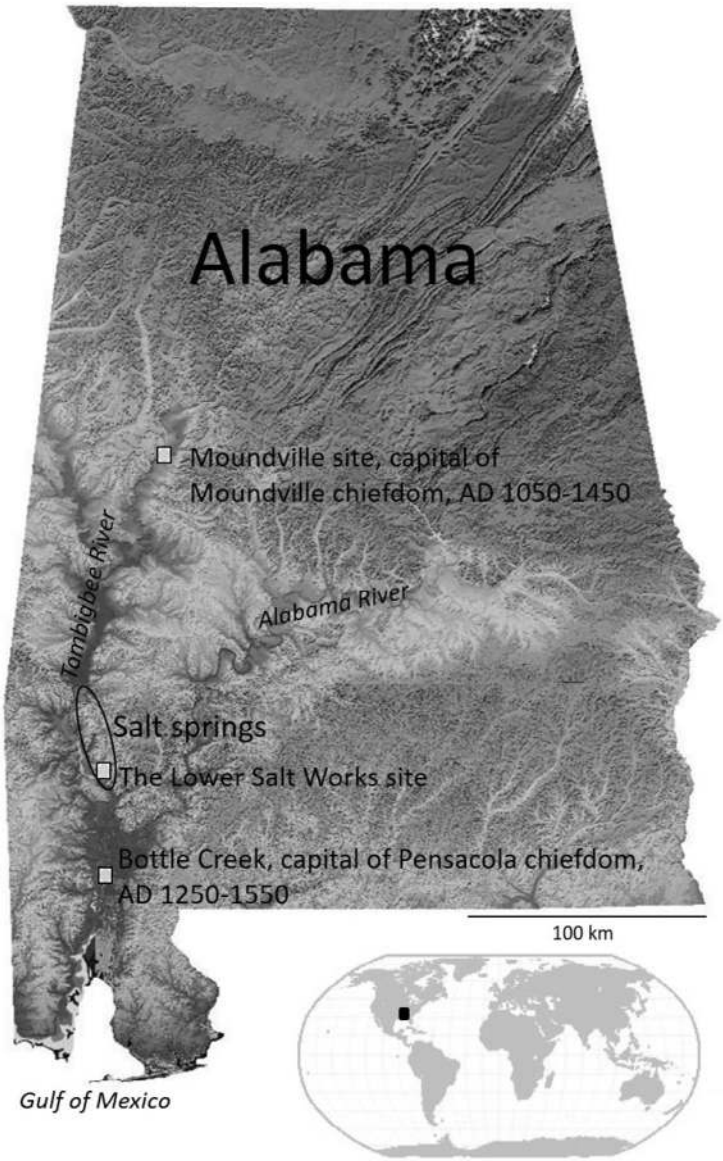

Figure 1. Map of southwest Alabama showing salines and major archaeological sites mentioned in the text.

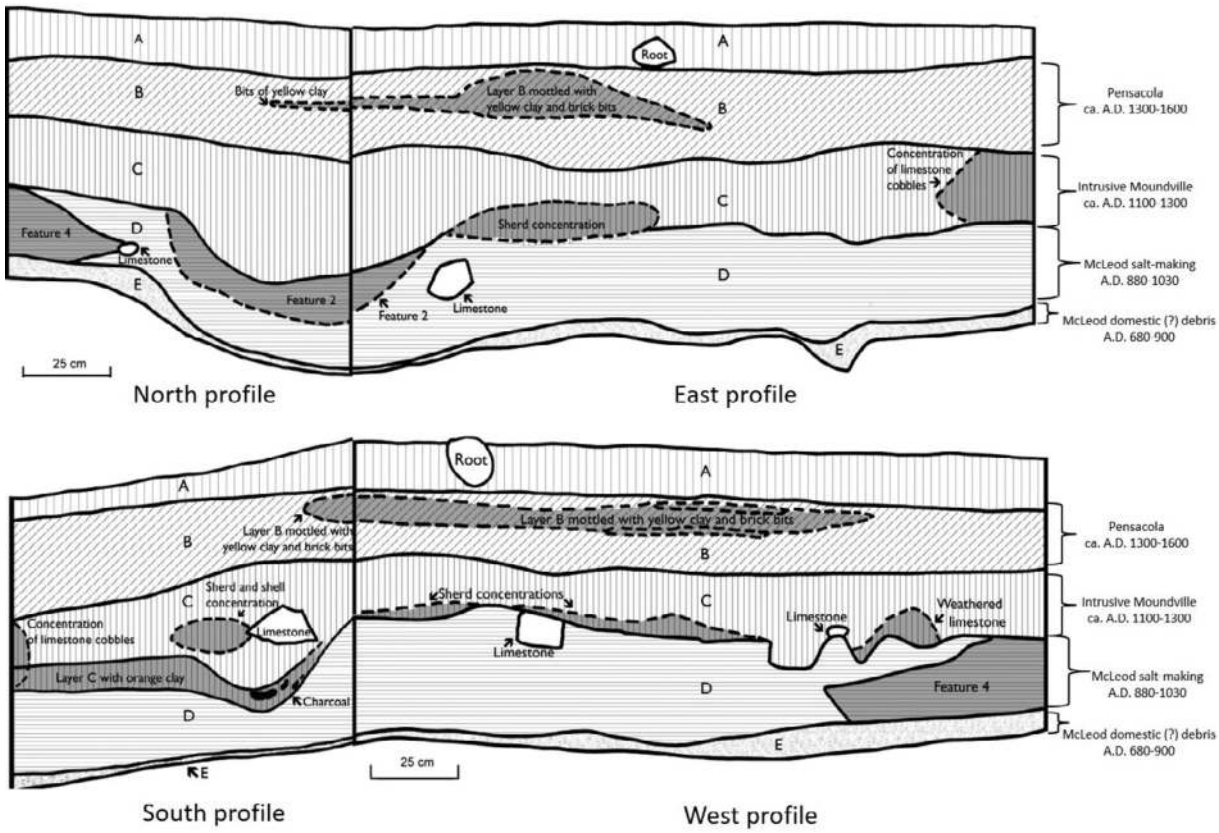

Figure 2. Cross-sections of an excavation unit at the Lower Salt Works with approximate ages of each cultural layer.

basket or bag. Nevertheless, this is the first excavated assemblage of non-domestic, special-purpose McLeod material, and it seems certain that the special purpose was making salt.

In fact, what these two layers within this single, small unit reveal is one of only two clearly demonstrated examples of people making salt during the Late Woodland period in the Southeastern US. The molded bowls are a more expedient form of making a pot than preparing clay coils. The increase of line-stamping over checked stamping is a mystery and may have had a functional application, such as reducing the chance of spalling, but it also may simply have been the way for McLeod people to mark them as salt bowls. The preponderance of these thin bowls with exterior fire-clouding and well-worn interiors, in addition to the heat-reddened stacks of limestone, strongly suggest that McLeod people were practicing a sal cocida, or boiling, method of making salt by either of two possible scenarios. In the first, brine was collected in jars and boiled in shallow open bowls slightly elevated above a fire on stacks of limestone or potsherds. When it began to crystallize, McLeod salt-makers scraped it off the sides, probably adding more brine until the solution became a thick porridge, or slurry, of wet salt. The salt could then be poured into baskets or onto mats to be dried. The second possibility is that the salt continued to be cooked down in the bowls until it dried and hardened. The damage to the interior of the vessels could be attributable to spalling of the surface due to salt absorption. There is ethnographic evidence to support both hypotheses—in Mexico (Andrews 1983:89-91; Parsons 2001), Guatemala (Coe and Flannery 1967; Dillon et al. 1988; Reina and Monaghen 1981; Sisson 1973), Belize (McKillop 2002), and several places in East Africa (Connah 1996; Sutton and Roberts 1981), among others.

The question of how much salt was made by McLeod people is nearly impossible to answer without more data, and an abundance of artifacts does not necessarily equate with large-scale production. McLeod people had a diverse diet of fish, mammals, mussels, and a variety of starchy plants, and the evidence is growing that maize was important in this region. We must also consider the possibility that it was being made for some other reason, perhaps medicinal, and/or for trade to people who clearly did need salt as a supplement. At McLeod domestic sites, however, there is no evidence for trade such as foreign pots, lithics, or other exotic goods. If trade was the motive, they must have received something organic in return—food, feathers, political alliance, or something equally difficult to trace archaeologically? And to whom might they have been trading?

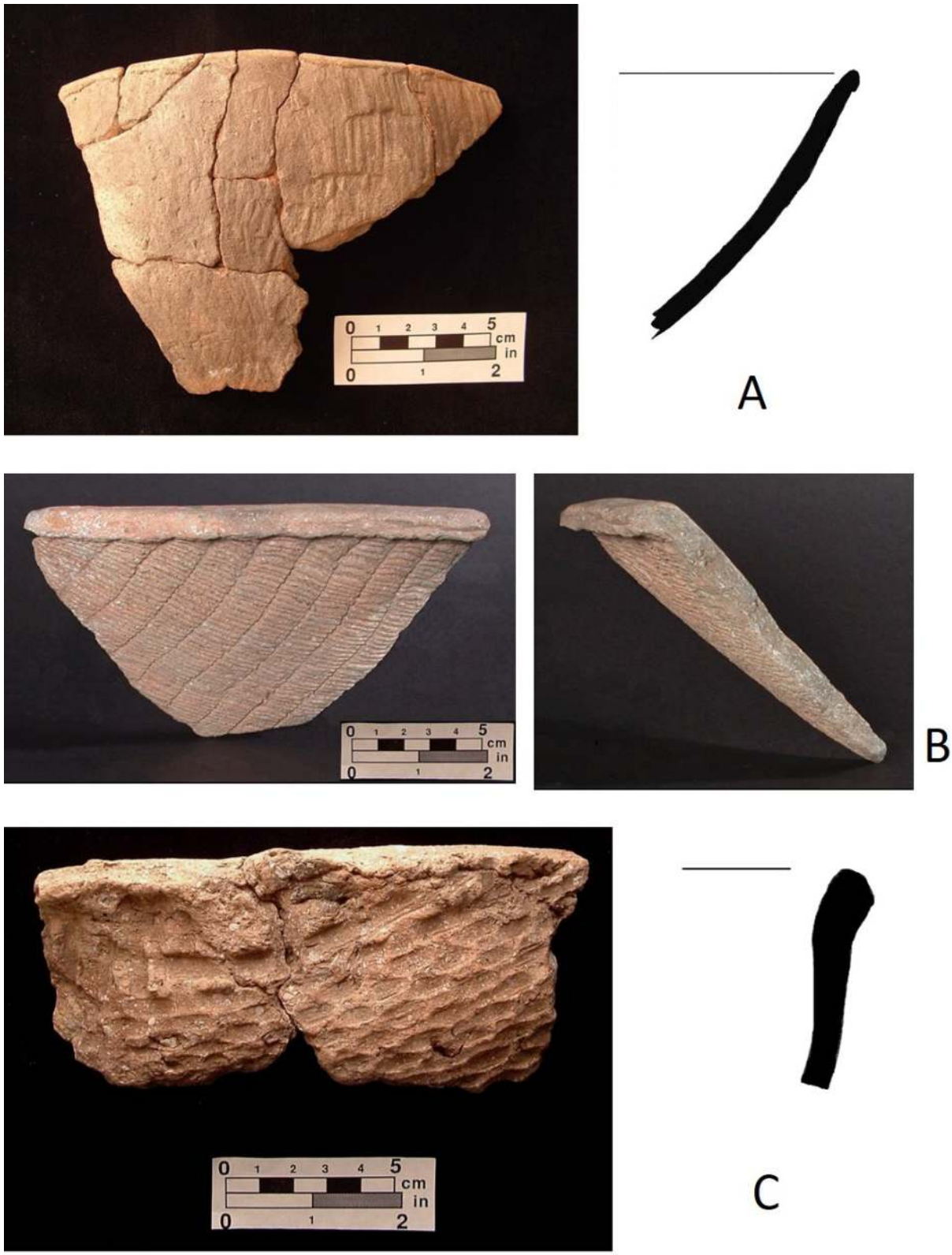

Figure 3. Typical salt-making pottery types from southwest Alabama: a) McLeod salt-making bowl (c. AD 880-1030); b) Fabric impressed saltpan (c. 1100-1300); c) Basket impressed bowl/pan (c. 1300-1600).

At some point around 900 years ago people from outside the lower Tombigbee River Valley arrived to make salt. They were a foreign ethnicity, with an entirely different economy, political organization, material culture, and probably, language. Archaeologists refer to them as the Moundville culture after the large multiple-mound city that served as the capital of their chiefdom (see Figure 1). They were one example of a broader Eastern North America era marked by the beginning of intensive maize agriculture, kin-based social ranking, hereditary chiefs who extracted tribute, and a widespread set of shared religious beliefs. The pottery used to identify Moundville culture is distinctly different from anything made in the Late Woodland period. It was coiled, tempered with crushed mussel shell, includes a wide range of vessel forms, and can be divided into common, utilitarian pots and more finely-made serving pots. Moundville culture was centered 250km north of the salines on the Black Warrior River and dates to AD 1050 to 1450. It was introduced from the Central Mississippi Valley and began to flourish in central Alabama while Late Woodland cultures, such as McLeod, continued their own traditions. But around AD 1100, Moundville pottery appears in southwest Alabama only at a few sites on the Gulf Coast, on an island in Bottle Creek at the center of the Mobile-Tensaw Delta, and at the southwest Alabama salt springs. There are no other early Mississippian sites in the region. Archaeologists believe that emissaries or specialists attached to the Moundville chiefly class were seeking sources of marine shell for making jewelry, salt for their agricultural populations and for trade, and a location from which to control both.

Returning to the excavation unit at the Lower Salt Works (see Figure 2), Layer C is distinguished by a majority of shell-tempered pottery, including jars decorated with typical Moundville designs. There are no transitional forms, styles, or techniques in the pottery that would suggest a gradual cultural transition. While the contextual evidence indicates an invasion directly from Moundville, it is hoped that future X-ray fluorescence analysis of pottery from the salines will provide a definitive answer. However, most of the shell tempered pottery in Layer C was probably made on site, because it is in the form of large fabric impressed saltpans (Figure 3B). The method of employing fabrics to make large pans or basins for evaporating salt is a tradition that originated with the Mississippian era in the Central Mississippi Valley, where intensive agriculture and salt production were first practiced on a large-scale in Eastern North America.

Within Layer C at the Lower Salt Works were 1372 potsherds representing a minimum of 161 saltpans or large basins. The exteriors of 72% of these press-molded vessels bear the impressions of the fabrics used to line the molds. Four different fabric structures and knotted netting appear to have been used as mold liners to assist with picking up the pans. The remaining 28% of the saltpans are plain, averaging 7cm smaller in diameter and generally having a thinner body. The plain pans display about half the proportions of interior fire-clouding near their rims as do fabric pans, but how the fabric impressed or plain pans were used is still not understood. Considering the low numbers of small bowls and jars, it seems likely that some combination of solar and direct heat evaporation was employed. Fabric-marking or cord-marking is found on small cups at Late Postclassic Aztec salt-making sites along Lake Texcoco, Mexico (Holmes 1886: 70-72; Parsons 2001: 249-257), in the Tehuacan (Parsons 2001: 270-271, 273), and at Zhongba in China (Flad 2011), and is interpreted to have increased the surface area of the pot during the final stage of drying the salt through boiling; the salt would remain in these small vessels for transport as fairly uniformly sized salt cakes. This sort of specialization is not indicated in the lack of uniformity in saltpan shape and size in Alabama. If the fabric impressions conveyed an advantage in efficiency, then it was a benefit incidental to how the pot was made. After lining saltpan molds, the fabrics also could have been used to filter brine through salty soil, creating a concentrated brine before boiling. A working hypothesis is that salty soil was collected from the salt flats, filtered through the fabrics that had been used to make the saltpans, and then concentrated via solar evaporation in the fabric impressed pans. It was then boiled and dried in the smaller plain basins.

The scale of early Mississippian salt production lacks the characteristics of true task specialization workshops, with tightly standardized vessel forms and sizes and year-round occupation. But there are plenty of ethnographic analogies— in Tanzania (Fagan and Yellen 1968: 30-31; Sutton and Roberts 1968: 53), New Guinea (Pétrequin et al.), Guatemala (Dillon 1977; Dillon et al. 1988), and Mexico (Williams 2002, 2015), as a few examples— where small family groups leave their homes and travel to a salt source. After the maize harvest, designated salt-makers from the Moundville chiefdom might have loaded their canoes with fabrics and other tools for their annual expedition to the salt springs near the Tombigbee River. There, they would set up camp, manufacture saltpans, gather fuel, and set about to making salt until they had enough to take home for the community and as tribute to their chief. With an abundance of salt springs in southwest Alabama, it seems improbable that any control over them could be exercised without a substantial and permanent resident population. It should also be remembered that for at least two generations after the arrival of the first Moundville people, McLeod ways of life carried on uninterrupted in the hills and terraces outside of the saline areas.

Around AD 1250, some group from the Moundville culture moved south, only 30km downstream of the salines, and established a permanent settlement on the island in Bottle Creek (see Figure 1). Located symbolically in the heart of the Mobile-Tensaw Delta, Bottle Creek grew to have 18 earthen mounds around a central plaza (Brown 2003). It was situated ideally to control north-south river trade and east-west trade along trails and the Gulf Coast, and there is abundant ceramic evidence at Bottle Creek for both foreign trade and visitors. The influence of people who settled at Bottle Creek spread throughout the region, including the salines, until their particular brand of Moundville-type pottery transformed into something distinct that archaeologists call the Pensacola culture. As Pensacola culture fluoresced, Moundville culture to the north was on the decline, and the McLeod culture was completely absorbed into this new agricultural way of life.

In the upper layers of the Lower Salt Works excavation, 90% of the Pensacola potsherds are a type of salt production vessel (see Figure 2). These large basins have slightly more vertical and thinner sides than saltpans, are slab molded and impressed with woven cane matting or basketry (Figure 3C). They are unique to south Alabama. The use of baskets and other containers to filter salty soil for concentrated brine is well-documented in the ethnographic record across the world and in the Southeast, where sixteenth-century Spanish explorers observed Native Americans doing this at salines in present-day Arkansas. Sooting and fire clouding was found on a handful of cane impressed basins, and without more analysis, we can only hypothesize that they were used as boiling vessels. Unlike fabric impressed and plain saltpans, cane impressed basins are found at the salt springs and in nearly every non-saline Pensacola site in the region. The implication is that salt was reduced in the cane impressed basins and not removed until it reached its destination. What we do know is that woven cane requires less labor to make than fabrics; that leaching through baskets improves efficiency and reduces fuel costs; and that the demand for dietary and trade salt by Pensacola people would have been high.

The salt-making debris within one unit at the Lower Salt Works has provided enough data to begin deciphering the technology of making salt, whether heated by the sun or with fires and in what order, and with more specialized analysis, experimentation, and ethnographic analogy, we will likely develop better approximations of the organization and degree of specialization. But the point of this sort of study, of course, is to understand the role of salt in the lives of those who made it. In this paper, I hope to have demonstrated that McLeod people were making salt under different economic and political forces than those driving Mississippian Moundville people, whose need for salt is recognized not only by a change in technology but in an eventual permanent migration of people. The rise of Pensacola culture after AD 1250 was rapid, consuming, and perhaps entrenched in their exclusive control of salt.

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References

Andrews, A. P. 1983. *Maya Salt Production and Trade*. Tuscon, The University of Arizona Press.

Brown, I. W. (ed.) 2003. *Bottle Creek: A Pensacola Culture Site in South Alabama*. Tuscaloosa, The University of Alabama Press.

Clayton, L. A., V. J. Knight, and E. C. Moore (eds.) 1993. *The DeSoto Chronicles: The Expedition of Hernando de Soto to North America in 1539-1543* I. Tuscaloosa, The University of Alabama Press.

Coe, M. D. and K. V. Flannery. 1967. *Early Cultures and Human Ecology in South Coastal Guatemala*. Smithsonian Contributions to Anthropology 3. Washington, D.C., Smithsonian Institution.

Connah, G. 1996. *Kibiro: The Salt of Bunyoro, Past and Present*. British Institute in Eastern Africa Memoir 13. London, The British Institute in Eastern Africa.

Dillon, B. 1977. *Salinas de los Nueve Cerros, Alta Verpaz, Guatemala. Preliminary Archaeological Investigations. Socorro*, New Mexico, Ballena Press Studies in Mesoamerican Art, Archaeology, and Ethnohistory, No. 2.

Dillon, B., K. Pope, and M. Love. 1988. An Ancient Extractive Industry: Maya Saltmaking at Salinas de los Nueve. *Journal of New World Archaeology* 7, 2-3: 37-58.

Dumas, A. A. 2007. Salt and Society: *The Role of Salt in the Late Woodland to Early Mississippian Transition in Southwest Alabama*. Unpublished PhD dissertation, University of Alabama.

Fagan, B. M. and J. E. Yellen. 1968. Ivuna: Ancient Salt Workings in Southern Tanzania. *Azania* 3: 1-44.

Flad, R. 2011. *Salt Production and Social Hierarchy in Ancient China: An Archaeological Investigation of Specialization in China's Three Gorges*. Cambridge, Cambridge University Press.

Holmes, W. H. 1886. Evidence of the Antiquity of Man on the Site of the City of Mexico. *Transactions of the Anthropological Society of Washington* 3: 68-81.

McKillop, H. 2002. *Salt: White Gold of the Ancient Maya*. Gainesville, University Press of Florida.

Parsons, J. R. 2001. *The Last Saltmakers of Nexquipayac, Mexico: An Archaeological Ethnography*. Anthropological Papers, No. 92, Museum of Anthropology. Ann Arbor, University of Michigan.

Pétrequin, Pierre, Olivier Weller, Émilie Gauthier, Alexa Dufraisse, Jean-François Piningre. 1999. Salt springs exploitation without pottery during Prehistory. From New Guinea to the French Jura. *Ethno-archaeology and its Transfers, Papers from a session held at the European Association of Archaeologists Fifth Annual Meeting in Bournemouth 1999*, S. Beyries and P. Pétrequin (eds.). British Archaeological Reports International Series 983:3-65. CNRS-UNSA, Centre d'études Préhistoire, Antiquité, Moyen Âge.

Reina, R. E. and J. Monaghan. 1981. The Ways of the Maya: Salt Production in Sacapulas, Guatemala. *Expedition* 23: 13-33.

Sisson, E. 1973. *First Annual Report of the Coxcatlan Project. Tehuacan Project Reports 3.* Andover, Massachusetts, R. S. Peabody Foundation.

Sutton, J. E. G. and A. D. Roberts. 1968. Uvinza and Its Salt Industry. *Azania* 3:45-86.

Williams, E. 2002. Salt Production in the Coastal Area of Michoacan, Mexico. *Ancient Mesoamerica* 13: 237-253.

Williams, E. 2015. *The Salt of the Earth: Ethnoarchaeology of Salt Production in Michoacán, Western Mexico.* Oxford, British Archaeological Reports International Series 2725, Archaeopress.

Recent Archaeology of Salt in Southeastern North America

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Abstract

This paper draws largely from recent reports and syntheses of salt-making in eastern North America to provide the latest information on prehistoric and historic salt production sites from the southeastern region. Excavations and analyses in the states of Alabama, Tennessee, and Louisiana within the last decade have expanded our understanding of the scale and variety of production technologies. Of particular interest is the near complete reliance on salines springs and that, despite widespread geographical and chronological studies of salt production in the region, evidence for the use of briquetage, so commonly associated with salines elsewhere, remains rare. Direct boiling and solar evaporation seem to have been preferred in late prehistory, while filtering soil to create brine may not have been widely adopted until the sixteenth century.

Keywords: salines, saltpans, fabric, Mississippian culture, American Civil War.

If the archaeological world is familiar at all with the salt resources in eastern North America, it is largely through reports and syntheses by Ian W. Brown (1980, 1981, 1999, 2003, 2010, 2014, 2015). He was the first archaeologist to compile data from all of the known salt sites and to identify patterns in the chronology, geography, and processes of manufacturing. I refer the reader to Brown's seminal 1980 and 1981 publications and to his 2010 synthesis of known salt sites in the region for a comprehensive background on the archaeology of salt in eastern North America. Additionally, a new review of the prehistoric techniques used in salt production in this region was published last year and re-emphasized the need for testing hypotheses originally outlined by Brown in his earlier works (Eubanks and Brown 2015). One result of Brown's work has been an increased interest in the anthropology and archaeology of salt in this region, which has expanded in the past decade through research by several of his students and through cultural resource management projects. This paper presents a brief overview of the most recent and ongoing efforts to understand the production, use, and social impact of salt in the southeastern part of the continent, particularly since Brown's 2010 summary. First, a succinct introduction to the region's geography and relevant culture history is necessary to orient the reader to the general context in which salt production occurred here.

Geology and geography

In the woodlands of eastern North America, there are few naturally-occurring outcrops of crystalline salt. Salt is primarily accessible on the surface of the ground because of salt springs, or salines. Salines of the southeastern part of the continent were formed when connate water was pushed upward through buried salt deposits that had been created from the evaporation of a vast, Jurassic-age inland sea. Salt deposits from interior eastern North America are derived from much older rocks, whose salt content is dissolved into ground water through high heat and pressure. The distribution of salines is uneven, with concentrations in the Ohio and Cumberland river valleys, the Red River Valley, the central Mississippi Valley, central New York, and isolated locations in coastal Louisiana and south Alabama (Brown 1980, 2010; Jakle 1967) (Figure 1). Regions with many salt springs had at least one major trail leading to them (Myer 1928), and this interconnected web probably meant that most prehistoric peoples had access to salt (Wentowski 1970: 43; Swanton 1946: 255). Areas with many springs are known as 'licks' in reference to the numerous animals that have congregated there to lick the salt, and it is likely that Native Americans[1] hunted at salt springs after arriving in the region around 13,000 years ago. Other sources of salt include coastal bodies of water and sodium-bearing plants. There is little evidence for prehistoric use of the former (*c.f.* Swanton 1946: 300) but, for the latter, some ethnohistoric reports mention using the ash from certain plants as a source of sodium (Brown 1980: 9; Dyson 2006; Gilbert 1978: 184; Hamel and Chiltoskey 1975: 56).

[1] 'Native American' is a political term that highlights the presence of many diverse cultures in the New World prior to the arrival of Europeans. Although the etymology of the term 'Indian' reflects a historical misunderstanding of indigenous peoples, it is nevertheless widely accepted as an inoffensive reference to them and is often used by native peoples to refer to themselves. In the current style of American archaeology, the terms 'Native American' and 'Indian' are used interchangeably in this paper.

Uses for salt

Archaeologists have focused on the dietary use of salt by southeastern natives as a means to sustain health after foraging populations became reliant on maize for a majority portion of their diet around 1000 years ago. With only a few exceptions (Hunter 1940; Wentowski 1970), the potential historical uses of salt for technological, healing, or religious practices has been generally neglected. Although there is no direct evidence for using salt as a mordant in textile production, the region has a rich heritage of textile production using plant fibers, so it is likely that native peoples knew the value of salt for fixing dyes. Through ethnohistoric documents, we know that salt was used as a preservative for meat or animal skins only after generations of sustained European contact. The long held native tradition was to smoke meat. Other technological uses for salt among southeastern Indians are unknown but should not be discounted without more evidence.

The importance of salt in the spiritual lives of native cultures across the continent is supported by its frequent mention in mythology, rituals, and taboos. In the Southeast, for example, among Muscogee, Cherokee, Yuchi, and Chickasaw Indians, there are documented taboos against the use of salt before, during, or after the Green Corn Ceremony, a celebration of thanksgiving for the last harvest of maize (Adair 2005: 143; Hawkins 2003: 765, 785; Neumann 1977: 294-295; Speck 2004: 45, 114, 118; Swanton 1928: 572-573, 577-578, 604). Across much of the continent, salt was taboo during rites of initiation and birth (Hunter 1940). This practice very likely relates to the belief that salt was considered by many Native Americans to have 'hot' properties (e.g. Mooney and Olbrechts 1932), which can have dangerous or healing effects, depending on the situation. In Native

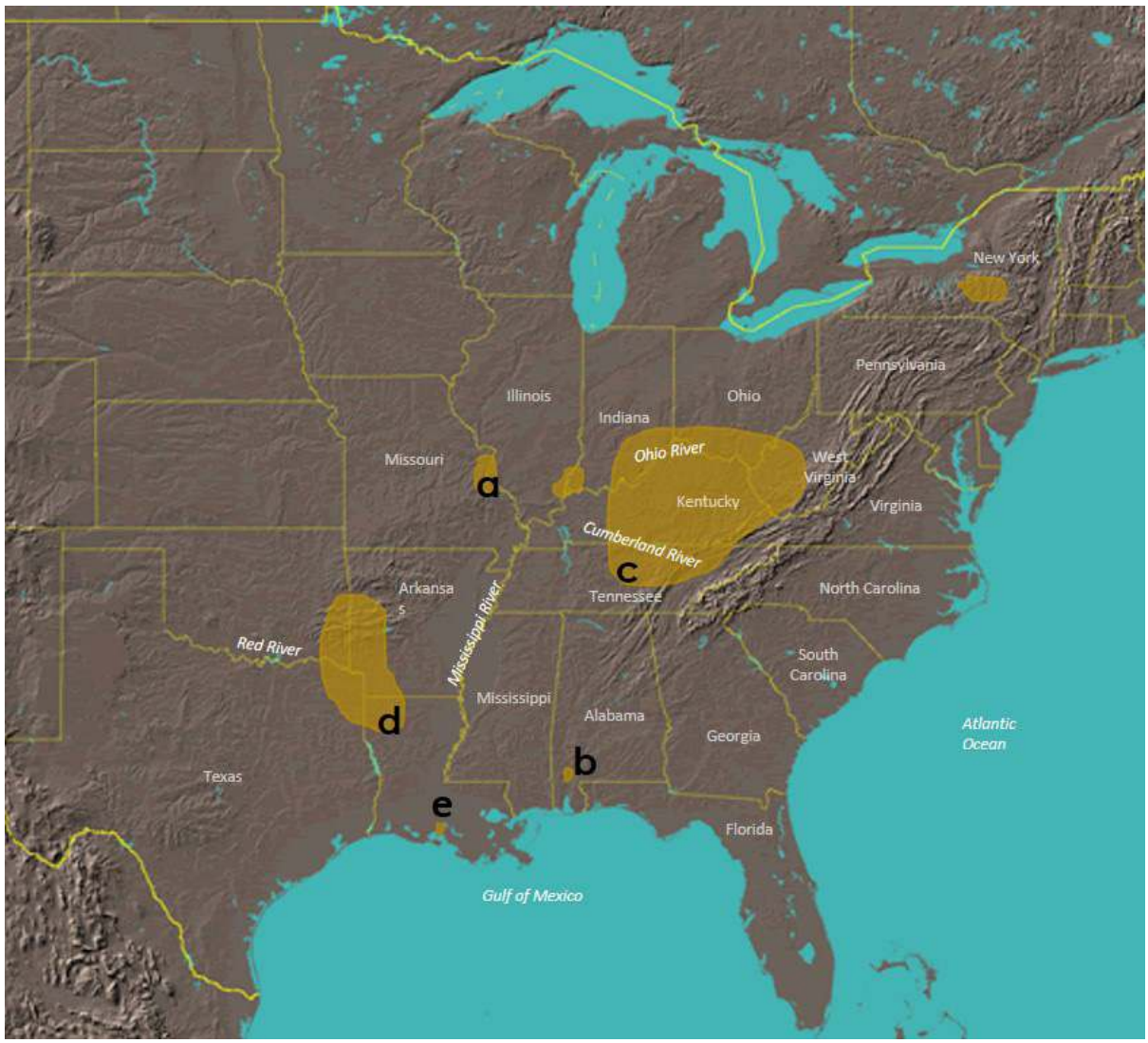

Figure 1. Map showing areas with salt springs in eastern North America and key sites mentioned in the text: a) Kimmswick, Missouri; b) southwest Alabama springs; c) Sulphur Dell site in Nashville, Tennessee; d) Drake's Lick, Louisiana.

American folklore, salt may be indirectly responsible for some of the most interesting stories of giant men and giant beasts, tales which might have originated or been enhanced among salt-makers who encountered the bones of extinct Pleistocene mega fauna that died, or were killed, while congregated at salines.

Cultural chronology and salt-production methods

There is no evidence that Native Americans made salt until the Late Woodland period (*c.* AD 700-1000). Late Woodland societies subsisted largely on wild foods supplemented by small gardens, but the period was marked by increasing populations and warfare. People in many regions were compelled to intensify food production within restricted territories of fertile river valleys to accommodate their growing numbers, and domesticates such as maize, beans, and squash became increasingly important sources of calories. The significant increase in dental caries among Late Woodland skeletal populations alone demonstrates a heavier reliance on maize compared to earlier foragers. Given these dietary shifts, it is not surprising that the earliest evidence for salt production dates to the Late Woodland period. Late Woodland salt production seems to have been an opportunistic activity for anyone with access to salines, and so far, there is no evidence for standardized production or specialized methodology indicative of commodification. The few sites with evidence for salt-making by pre-agricultural Late Woodland peoples yield shallow bowls (less than 30cm diameter) suggestive of evaporating brine directly over a fire (Dumas 2007; Keslin 1964; Muller and Renken 1989).

The number of salt production sites increased during the agricultural Mississippian period (*c.* AD 1000-1550), when populations nucleated into large towns and were supported by surplus crops of maize and other domesticates. Society was controlled by powerful hereditary chiefs, who managed food surpluses, warfare, and trade, their elite positions symbolized by the exclusive right to live on flat-topped earthen mounds. Those with salt springs in their territories may have sought control over its production and/or distribution, but the wide dispersion of salines would have made this difficult. The political centers of these chiefdoms are marked by multiple earthen mounds, upon which chiefs, priests, and other elites lived, and it may be no coincidence that the area of the US with the most salines was once known for its 'remarkable quantity' of such landmarks (Brown 2010; Muller 1984, 1987; Meyers 2002; Webb and Funkhouser 1932: 417). Nevertheless, the idea of political control over salt in eastern North America is difficult to substantiate, and we can only infer that salt production increased in the Mississippian period to satisfy the dietary needs of an increasingly plant-based diet.

Mississippian-period salt sites are recognized by the lack of domestic artifacts, such as stone tools and faunal remains, and by the presence of thousands of pottery fragments from vessels called 'saltpans.' Saltpans were tempered with coarsely ground, freshwater mussel shell and were formed as shallow basins as large as 1m in diameter. There are basically two different categories of saltpans—impressed and plain (Figure 2). It is widely suggested that saltpans were so large that a piece of textile or woven matting was necessary to support the vessel while the clay was shaped and to lift it from its mold, leaving impressions of these materials on the exterior surface of the saltpan (Brown 1980: Fig. 6). Distinctive thickened rims were useful for removing the pans from their molds and perhaps moving them around the site.

Plain saltpans (those with no fabric impressions) tend to be slightly smaller in diameter and have thinner walls. After mapping the distribution of fabric impressed and plain saltpans, Brown (1980: Fig.11) determined that, over the course of the Mississippian period, plain pans generally appear later in salt-making chronological sequences. At some sites, the amount of plain saltpans increased in proportion to fabric impressed saltpans but never replaced them (Brown 1980; Holmes 1903). This suggests an alteration in the methods used to make salt. At one site, for instance, plain and fabric impressed pans were found in different areas of the site, the former being embedded in the ground on top of a terrace (Bushnell 1907: 1-3, 1908: 1, 1914: 662). Several archaeologists (Brown 1980, 2010; Dumas 2007; Eubanks and Brown 2015; Muller and Renken 1989) also contend that fabric impressed and plain pans appear together in some contexts and in significant enough quantities to suggest that they were in use simultaneously, each for a different function in the salt-making process.

Methods of salt production in eastern North America included direct-boiling and, perhaps, solar evaporation. Solar evaporation may have been more common in coastal western North America, as it is in Mesoamerica, where there is a predictable dry season, sparse tree cover, and ocean breezes to facilitate evaporation. It has been has suggested that one type of saltpan was used in solar evaporation to concentrate brine just before the crystallization and drying process over a fire and in the other type (Dumas 2007; Eubanks 2015). Limited studies of fire-clouding and soot marks on the exteriors of these vessels have been inconclusive. However, hearths and burned zones in association with salt-making pottery at salt springs occur with enough frequency to suggest that direct heat with fire was a preferred method for the interior eastern woodlands, with their temperate climates, abundant fuel and strong salines. The intensity and duration of the burning varies greatly across the sites, and it has been difficult to distinguish pottery firing from boiling hearths, about which we

Figure 2. Examples of saltpans found at many salt springs in eastern North America during late prehistory (c. AD 1000-1550): a) portion of a fabric impressed saltpan and a negative impression of its exterior surface showing fabric structure (Beckum Village site, Alabama; b) plain saltpan rims (Lower Salt Works site, Alabama).

have so little information. A procedure known as 'stone boiling' or 'indirect heating' was used widely in prehistoric native America for heating water or baking food in earth ovens, and heated stones may have been placed in saltpans to evaporate brine at central Mississippi Valley salines, where large amounts of fire-cracked rock are common (Bushnell 1907; Eubanks and Brown 2015). At Kimmswick, Missouri, for example, fire-reddened stones were found around 28 hearths and within some of the four complete saltpans that were uncovered (Bushnell 1907, 1908). Unfortunately, because of poor reporting or disturbance at sites with fire-altered stones, it is difficult to say that indirect boiling was part of the brine reduction process.

The widespread use of briquetage in salt-boiling processes across the world logically led Brown (1980) to investigate whether items such as clay pedestals, firebars, rods, or augets also were part of the salt-making toolkit in eastern North America. Currently only a few such objects have been found and not all of them in association with salt production sites (Brown 1980, 1999, 2010; Eubanks and Brown 2015; Kenmotsu 2005). Although he cites Kleinmann's (1975: 45) definition of briquetage as 'any clay objects used in salt production' (Brown 1980: 65-66), there since appears to have been some shift in how US archaeologists think of the term. The emphasis in the search for briquetage has been on pedestals and augets, perhaps because they are rare, unusual forms here and because any augets, in particular, could have important implications for the trade and distribution of salt in political economies. As a result, works in the last decade tend to identify clay evaporative containers simply according to their vessel form, while reserving the term 'briquetage' solely for clay supports or transport containers (e.g. Dumas 2007, Eubanks 2015; Eubanks and Brown 2015; Guidry and McKee 2014). If, however, we conform to the definition of briquetage as 'any clay objects used in salt production,' then one can say that eastern North American salt springs—in the forms of saltpans, small bowls and jars—have comparably huge amounts of briquetage as salt sites in Europe, Africa, or Mesoamerica. Should this term be reserved for tools other than evaporative vessels, then we can conclude that Native Americans used an informal sort of briquetage comprised of rocks, stacks of broken pottery, and incidentally fired clay to support saltpans, bowls, or jars in the evaporative process.

Recent salt archaeology projects

Alabama

Salt springs emerge from a geologic fault in the southwestern corner of the state of Alabama. These springs were exploited by Indians from the Late Woodland period (*c.* AD 800-1100) until their forced removal from the region in the early nineteenth century. Excavations were undertaken in 2004 and 2005 with the aim of understanding the chronology, methods, and intensity of salt production of these salines during prehistory. Results of that project are detailed in another chapter in this volume. In this section, first, I will focus on another discovery related to the materials of salt production that were recovered from the Alabama salines, followed by a description of the nineteenth-century production of salt in the state.

Organic artifacts do not preserve well in the archaeological record of the humid woodlands of eastern North America, thus the impression of fabrics on the exterior of saltpans are the most abundant source of data for studying ancient textiles for the period of time in which they were used. An ongoing examination of saltpan fabric impressions suggests that they can be an indirect source of learning about changes in the intensity of the salt production process and, by inference, of the importance of salt in society. In her thesis on the topic, textile expert Mary Spanos (2006) looked at thousands of fragments from impressed

saltpans from Mississippian-period salt making sites in south Alabama. She found that the fabrics used to make saltpans during the Early Mississippi period (*c.* AD 1100-1250) consisted of worn skirts, shawls, bags, and other fabrics that probably were typical for a household. They include a diverse range of fabrics, from coarsely woven, utilitarian fabrics to very finely made, complex structures that might have taken weeks to complete. The impressions of these fabrics on saltpans reveal tears, holes, and frayed fibers. The diversity of fabrics and the frequent evidence for wear imply that salt makers were repurposing their old household fabrics into making saltpans.

Several generations later, the fabric impressions on saltpans from Middle (*c.* AD 1250-1400) and Late Mississippi (*c.* AD 1400-1550) period components display almost exclusively coarse, utilitarian fabrics of a single weave structure. The yarn is poorly processed and the fabric structure is simple, requiring a low amount of labor to manufacture (Spanos 2006). The change from using old household fabrics to using homogenous, coarse fabrics to mold saltpans has been documented stratigraphically (Dumas 2007). A possible explanation for this change is that, at the few early salt-making components in south Alabama, the available amount of discarded household fabrics was enough to keep up with demand for salt. Over time, the number of salt-making components in the region increases, implying an increase in the demand for salt, thus more saltpans for making it. Spanos (2006) and Spanos and Dumas (2005) posit that coarse fabrics were constructed *specifically for* making saltpans more efficiently, presumably to meet the increased demand for salt. Thus, the study of fabric impressions on saltpans presented an unexpected opportunity for insight into the scale of salt production during the Mississippian period, and I hope that similar studies of fabric impressed saltpans will be undertaken elsewhere in order test this idea.

Another Alabama salt project is focused on documenting the extensive salt production facilities associated with the American Civil War (1861-1865). By the nineteenth century, salines in eastern North America were used to supply local markets, but most salt was being cheaply imported from the Caribbean or from England (Brown 2010, 2014; Lonn 1965). In the Southeast, cotton was shipped to English textile mills and salt was among the goods shipped back, often serving as ballast. This exchange was interrupted in 1862, when southeastern ports on the Atlantic and Gulf of Mexico were blocked by the US Navy, thus preventing any salt from entering. As a result, a great 'salt famine' threatened the South's ability to cure meat or tan leather just at the time of increased military demand for those products. Existing salt works, like those in Virginia, had elaborate furnaces that were supplied with brine from nearby drilled wells. Slaves from towns and farms were leased to the salt works and tended furnaces 24 hours a day, six days a week, though most slaves were tasked with clearing surrounding forests for fuel (Lonn 1965; Stealey 1993). Still, demand for salt was not met. In response, the governments of southern states with salt springs established salt works to supply their own soldiers and citizens. (Only on Avery Island, Louisiana, was rock salt discovered and mined, a mine still operating today).

Results from surveys undertaken from 2002 to 2004 at the three major Alabama salt works revealed significant differences between the construction of state-operated furnaces and those operated by private companies or individuals. Furnaces generally were 10m long, 2 m wide, with a firebox at one end and a chimney at the other. The state salt works were built primarily of brick made onsite and used rectangular iron pans manufactured specifically for the furnaces. Associated with the complex of furnaces was a hospital, cemetery, store, and housing. Only the location of the cemetery is known, but the remains of the 'salt boom town', when discovered, will have much to offer toward the history of salt production during wartime and the use of enslaved labor. Individual citizens and corporations leased access to salines and hastily constructed their own furnaces, sometimes using whatever materials were available. An initial survey of this section of the salt works revealed furnaces made of locally quarried limestone and a variety of brick types. The evaporating pans included large iron kettles, repurposed from laundry or food-processing duties, and iron pans. Occasionally, however, resourceful individuals would acquire boilers from steamships, which would be cut in half lengthwise, placed over furnace trenches, and used to boil brine. Such resourcefulness demonstrates remarkable effort for what many at the time hoped would be a temporary shortage. When news of the Civil War's end reached the salt works in 1865, the salt makers fled. It was the last time that salt was made in the South on such a scale. In the Northeast, making salt became fully industrialized, and great cities such as Cincinnati and Syracuse were developed in part because of their proximity to salt.

Tennessee

In 2014, archaeology was undertaken in Nashville, Tennessee, prior to the construction of a minor league baseball stadium. The Sulphur Dell site (also known as French Lick) is located near the Cumberland River across from the site of a large Mississippian-period town with multiple earthen mounds. Today, Sulphur Dell is in an urban area that has been highly disturbed, but excavators were able to find some intact activity areas, in fact because they had been protected underneath the foundations of an old ice factory. Forty-two individual

features were arranged in four clusters over a broadly burned area. The pits were round, linear, and oval, one of the latter bearing evidence of burning to a depth of 60cm. A t-shaped pit (Feature 8) is reminiscent of some found in Mexico (Liot 2000; Williams 2015) and has a stack of limestone rocks in the center (Figure 3). All of the pits contain multiple, dense layers of ash, charcoal, and hardened clay indicative of *in situ* burning, and one contains a large portion of a plain saltpan still resting in a hearth. There is currently considerable discussion (e.g. Brown 2010; Eubanks and Brown 2016) about whether the pans were heated indirectly or directly, and the methods could have been used simultaneously to increase efficient evaporation, but it seems clear that direct boiling was employed for at least part of the process.

Thousands of fragments from fabric impressed saltpans from Sulphur Dell display a wide range of fabrics, supporting the excavator's contention, and supporting the research by Spanos described above, that the site dates to the e*arly* agricultural (Mississippian) period, *c*. AD 1100-1300. The huge pans are up to 40mm thick and 1m in diameter, certainly some of the largest ever recovered. Deposits of raw clay and mussel shells indicate that the saltpans were being made on site (Smith 2014). Historically, people have reported fabric impressed potsherds being distributed over a wide area around Sulphur Dell. Much of the area is now destroyed or buried beneath downtown Nashville, but the presence of a large salt-making site and a multiple mound site across the river indicates that this was once a significant center of salt production (Guidry and McKee 2014; Smith 2015).

The Sulphur Dell site excavations revealed another type of feature that is frequently associated with salt production sites in the Ohio and Cumberland river valleys. Two 1m diameter, basin-shaped pits contained large pieces of limestone placed in flat or upright positions. It bears a close resemblance to the thousands of stone-lined graves that were common in the region during late prehistoric times. Brown (1980: Fig. 3; 2004: Fig. 6) has demonstrated a close geographic correspondence between the distribution of salt springs and the occurrence of stone box graves in the mid-South. Particularly interesting is that salt makers often chose to use large fragments of saltpans, instead of stones, to line the graves (Brown 1981). Because of their oxidized edges and lack of human bones, the Sulphur Dell excavators classified the pits there as previously disturbed stone box graves or hearths (Guidry and McKee 2014: 58). It seems very unlikely that Native Americans would have used an existing grave as a salt-boiling hearth, and unfortunately, we may never know, because after these limited excavations, the Sulphur Dell site was covered with sand, reburied, and now rests beneath the new baseball stadium.

Figure 3. Cross-sections of Features 1, 16, and 8, salt-boiling hearths at the Sulphur Dell site, Nashville, Tennessee (courtesy TRC, Inc.).

Louisiana

In the late sixteenth and early seventeenth centuries, saltpans generally disappear from the archaeological record at salines and are replaced with bowls and/or jars (Brown 1999, 2010). The change is suspected to reflect attempts to increase the efficiency of salt-making methodology. Evaporating concentrated brine would more quickly yield salt and perhaps require less wood fuel (Brown 2010; Eubanks and Brown 2015). A few ceramic augets, pedestals, and other briquetage-like objects have been documented at a few sites in Louisiana (Brown 1980, 1999, 2010) and Texas (Kenmotsu 1999), and they are decidedly rare. Instead, rocks and stacks of broken pottery are more commonly found in association with hearth features at sites of this era.

Excavations of a seventeenth-century site, where bowls were the preferred tool, recently took place in northwest Louisiana. Caddo Indians inhabited this area and made salt intensively. Although salt as a dietary supplement was important for these agriculturalists and their trading partners, is was also in high demand for the preservation of deer skins in the enormous French deerskin market. Excavations at Drake's Lick led by Paul N. Eubanks were situated on low islands surrounded by expansive salt flats. Five 1m x 6m trenches and several smaller tests yielded numerous features and over 15,000 sherds from small bowls. These thin-walled hemispherical bowls have plain exteriors and interiors with occasional scraping marks (Figure 4). Deposits of pure clay and mussel shells suggest to Eubanks that the bowls were being made on site, and he posits that the narrow range of diameters, averaging around 20cm, indicates that wooden or clay molds were used to produce a fairly standard-sized bowl. At Drake's Lick, thick deposits of pottery around hearths, soot deposits on vessel exteriors, and a lack of stone or clay pedestals, indicate direct boiling supported by broken pots, perhaps until the salt was nearly dry (Eubanks 2015, 2016). The large amounts of broken bowls and scraping marks substantiate this hypothesis. The brine being boiled likely was created by filtering sand from the surrounding salt flats through baskets, a common practice throughout the world. We are fortunate to have a written account from a member of a Spanish expedition, who witnessed the following process taking place in nearby, present-day Arkansas, in 1541:

> The salt is made along by a river, which, when the water goes down, leaves it upon the sand. As they cannot gather the salt without a large mixture of sand, it is thrown together into certain baskets they have for the purpose, made large at the mouth and small at the bottom. These are set in the air on a ridge-pole; and the water being thrown on, [ceramic] vessels are placed under them wherein it may fall; then, being strained and placed on the fire, it is boiled away, leaving salt at the bottom (Gentleman of Elvas in Clayton et al. 1993: 124-125).

While the work at Drake's Lick has not necessarily revealed new technologies of salt-making in eastern North America —we know, for instance, of an identical process being used in sixteenth-century Michoacán (Williams 2015)—Eubanks' work is the first well-documented excavation of undisturbed salt production features of this period and type. The standardization described by Eubanks, whether intentional or simply the result of repetition, is likely reflective of the large, historically-documented demand for Caddo salt by French deerskin traders and colonists in the region (Eubanks 2014, 2016).

By the late eighteenth century, ethnohistoric accounts of many Native Americans groups refer to their complete dependence on Europeans, Americans, or alternative sources for salt. In one example, American agent to the Indians, Benjamin Hawkins (2003: 21), reports in 1796 that two Creek women provided him with food, in return for which, 'They wanted principally salt, that they used but little from necessity, and where they were able to supply themselves plentifully with

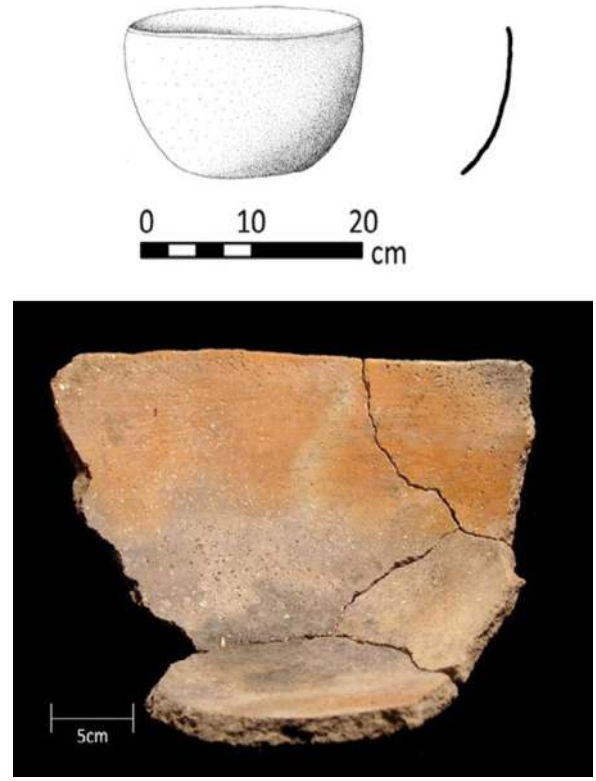

Figure 4. A small bowl from the Potter's Pond site that is typical of those used to evaporate salt at eighteenth-century salines in northwest Louisiana (from Eubanks 2016; Figs. 3.5, 6.1).

meat, they were unable to preserve it for the want of salt.' In this single quote we learn that native practices of preserving meat have changed from smoking to European-style salt-curing; that knowledge of salt-making techniques is gone; and/or that colonization has disrupted the native salt trade. Similarly, there was a scarcity of salt among the Cherokee Indians in the mid-eighteenth century, who were reduced to making a weak salt from the ashes of plants and suffered poor health as a result (Hatley 1989: 231).

Summary

Work in the Eastern U.S. thus far has defined the geographic range of pre-contact salt production sites, and we have a well-developed inventory of the tools used to produce salt, such as saltpans, bowls, and jars. But, until the past few years, archaeologists have had little success in isolating intact production areas and features. So many salt production sites were disturbed or largely destroyed by industrial-scale, nineteenth-century salt-making activities that finding earlier intact deposits is a challenge. US salt scholars need more ethnohistoric research, experimental archaeology, and interregional communication and discussion, as well as more publication. So much of our work remains unpublished as academic theses or in regional journals. The current research on salt across the world is impressive and informative, and being more directly involved with our colleagues around the world can significantly advance our own interpretation of salt in society, the cultures who made it in eastern North America, and the extent to which humans everywhere will go to fulfill their desire for the white mineral.

References

Adair, J. 2005. *The History of the American Indians.* K. H. Braund (ed.). Tuscaloosa, The University of Alabama Press.

Brown, I. W. 1980. *Salt and the Eastern North American Indian: An Archaeological Study*. Lower Mississippi Survey Bulletin No. 6, Peabody Museum, Harvard University, Cambridge.

Brown, I. W. 1981. *The Role of Salt in Eastern North American Prehistory*. Anthropological Study No. 3, Department of Culture, Recreation, and Tourism, Louisiana Archaeological Survey and Antiquities Commission, Baton Rouge.

Brown, I. W. 1999. Salt Manufacture and Trade from the Perspective of Avery Island, Louisiana. *Midcontinental Journal of Archaeology* 24: 113-151.

Brown, I. W. 2003. In Simple Terms: Why Study Salt? *Journal of Alabama Archaeology* 50: 36-49.

Brown, I. W. 2010. The Archaeology of Salt Springs in the Eastern Woodlands of the United States. In S. Li and L. V. (eds.) *Salt Archaeology in China: Global Comparative Perspectives*, Volume 2: 375-409. Beijing, Kexue chubanshe (Science Press).

Brown, I. W. 2014. *Time Travelers in England, Americans in Search of Salt*. Tuscaloosa, Borgo Publishing.

Brown, I. W. 2015. *The Petite Anse Project, Investigations along the West-Central Coast of Louisiana, 1978-1979*. In C. R. McGimsey (ed.), Special publication of the Louisiana Archaeological Society. Tuscaloosa, Borgo Publishing.

Bushnell, D. I. Jr. 1907. Primitive Salt-making in the Mississippi Valley, I. *Man* No. 13, pp. 1-5, pl. B.

Bushnell, D. I. Jr. 1908. Primitive Salt-making in the Mississippi Valley, II. *Man* No. 13, pp. 1-6, pl. E.

Bushnell, D. I. Jr. 1914. Archaeological Investigations in Ste. Genevieve County, Missouri. *Proceedings of the United States National Museum, Vol.* 46:641-668.

Clayton, L. A., Knight, V. J, Jr., and Moore, E. C. (eds.) 1993. *The De Soto Chronicles: The Expedition of Hernando de Soto to North America in 1539-1543*. 2 vols. Tuscaloosa, The University of Alabama Press.

Dumas, A. A. 2007. *The Role of Salt in the Late Woodland to Early Mississippian Transition in Southwest Alabama.* Unpublished PhD dissertation, Department of Anthropology, University of Alabama, Tuscaloosa.

Dyson, J. P. 2006. 'Salt-Grass' of the Inland Southeast. Unpublished paper presented at the 63rd annual meeting of the Southeastern Archaeological Conference, Little Rock, Arkansas.

Eubanks, P. N. 2014. The Timing and Distribution of Caddo Salt Production in Northwestern Louisiana. *Southeastern Archaeology* 33: 108-122.

Eubanks, P. N. 2015. A Reconstruction of the Caddo Salt Making Process at Drake's Salt Works. *Caddo Archeology Journal* 25:145-166.

Eubanks, P. N. 2016. *Salt Production in the Southeastern Caddo Homeland*. Unpublished PhD dissertation, Department of Anthropology, University of Alabama, Tuscaloosa.

Eubanks, P. N. Brown, I. W. 2015. Certain Trends in Eastern Woodlands Salt Production Technology. *Midcontinental Journal of Archaeology* 40: 231-256.

Gilbert, W. H. 1978. Eastern Cherokees. *Bulletin; Anthropological Papers*. New York, AMS Press.

Guidry, H. and McKee, L. 2014. *Archaeological Investigations of the Ballpark at Sulphur Dell* Nashville, Davidson County, Tennessee. Submitted to Capital Project Solutions by TRC Environmental Corporation. TRC Project No. 212578, Nashville, Tennessee.

Hamel, P. B. and M. U. Chiltoskey. 1975. *Cherokee Plants and Their Uses: A 400 Year History*. Sylva, N. C., Herald Publishing Company.

Hatley, M. T. 1989. The Three Lives of Keowee: Loss and Recovery in Eighteenth-Century Cherokee Villages. In P.H. Wood, G. A. Waselkov, and M. T. Hatley (eds.), *Powhatan's Mantle: Indians in the Colonial Southeast*: 223-248. Lincoln, University of Nebraska Press.

Hawkins, B. 2003. *The Collected Works of Benjamin Hawkins, 1796-1810*. H. T. Foster, II (ed.), Tuscaloosa, The University of Alabama Press.

Holmes, W. H. 1903. Aboriginal Pottery of the Eastern United States. In J. W. Powell (ed.), *Bureau of American Ethnology Annual Report for 1898-1899* 20: 1-237. Washington, D.C., Smithsonian Institution.

Hunter, H. V. 1940. *The Ethnography of Salt in Aboriginal North America*. Unpublished MA thesis, Department of Anthropology, University of Pennsylvania, Philadelphia.

Jakle, J. A. 1967. *Salt and the Initial Settlement of the Ohio Valley*. Unpublished PhD dissertation, Department of Geography, Indiana University, Bloomington.

Kenmotsu, N. 1999. *Investigations at the Salt Well Slough Site, 44RR204, a Salt-Making Site in Red River County, Texas*. Texas Historical Commission Archeological Reports 4, Austin.

Keslin, R. O. 1964. Archaeological Implications on the Role of Salt as an Element of Cultural Diffusion. *The Missouri Archaeologist* 26(1): 1-5.

Kleinmann, D.. 1975. The Salt Springs of the Saale Valley. In K. W. De Brisay and K. A. Evans (eds.), *Salt, the Study of an Ancient Industry*: 45-46. Colchester, England, Colchester Archaeological Group.

Liot, C. 2000. *Les salines préhispaniques du basin de Sayula (Occident de Mexique): Milieu et techniques*. British Archaeological Reports International Series 849. Oxford, Archaeopress

Lonn, E. 1965. *Salt as a Factor in the Confederacy*. Tuscaloosa, The University of Alabama Press.

Meyers, M. 2002. The Mississippian Frontier in Southwestern Virginia. *Southeastern Archaeology* 21: 178-191.

Mooney, J. and F. M. Olbrechts. 1932. The Swimmer Manuscript: Cherokee Sacred Formulas and Medicinal Prescriptions. Bureau of American Ethnolocy Bulletin 99. Washington, D.C., Smithsonian Institution.

Muller, J. 1984. Mississippian Specialization and Salt. *American Antiquity* 49: 489-507.

Muller, J. 1987. Salt, Chert, and Shell: Mississippian Exchange and Economy. In E. Brumfiel and T. Earle (eds.), *Specialization, Exchange, and Complex Societies*: 10-21. Cambridge, Cambridge University Press.

Muller, J. and L. Renken 1989. Radiocarbon Dates for the Great Salt Spring Site: Dating Saltpan Variation. *Illinois Archaeology* 1: 150-160.

Myer, W. E. 1928. Indian Trails of the Southeast. *42nd Annual Report of the Bureau of American Ethnology for 1924-25*, edited by. J. W. Fewkes, pp. 727-857. Washington, D.C., Smithsonian Institution.

Neumann, T. W. 1977. A Biocultural Approach to Salt Taboos: The Case of the Southeastern United States. *Current Anthropology* 18: 289-307.

Smith, K. E. 2014. Nashville—1,000 Years Ago—A Prehistoric Native American Metropolis. Unpublished report on file with the author.

Smith, K. E. 2015. History of Salt at Sulphur Dell. *The Tennessee Conservationist* March/April 2015: 32-35.

Spanos, M. 2006. *Mississippian Textiles at Beckum Village (1CK24), Clarke County, Alabama*. Unpublished MA thesis, Department of Anthropology, University of Alabama, Tuscaloosa.

Spanos, M. and A. A. Dumas 2005. Textiles Used in Salt Production: Evidence from South Alabama. Unpublished paper presented at the 70th annual meeting of the Society for American Archaeology, Salt Lake City, Utah.

Speck, F. G. 2004. *Ethnology of the Yuchi Indians*. Lincoln, University of Nebraska Press.

Stealey, J. E., III. 1993. *The Antebellum Kanawha Salt Business and Western Markets.* Lexington, The University of Kentucky Press.

Swanton, J. R. 1928. Social Organization and Social Usages of the Indians of the Creek Confederacy. *42nd Annual Report of the Bureau of American Ethnology*. Washington, D.C., Smithsonian Institution.

Swanton, J. R. 1946. *The Indians of the Southeastern United States, Bureau of American Ethnology Bulletin No. 137*. Washington, D.C., Government Printing Office.

Webb, W. S. and Funkhouser, W. D. 1932. *Archaeological Survey of Kentucky*. The University of Kentucky, Reports in Archaeology and Anthropology 2, Lexington.

Wentowski, G. 1970. *Salt as an Ecological Factor in the Prehistory of the Southeastern United States*. Unpublished MA, Department of Anthropology, University of North Carolina, Chapel Hill.

Williams, E. 2015. *The Salt of the Earth: Ethnoarchaeology of Salt Production in Michoacán, Western Mexico*. British Archaeological Reports International Series 2725, Oxford, Archaeopress.

Towards an Archaeology of Salt Production in Ireland

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Abstract

Salt-making is an under researched area of study in Ireland. Only recently prehistoric evidence of salt making has been recognised, and Medieval sources have largely been documentary rather than archaeological. Yet the production of salt was central to the Irish economy as it emerged in the Late Medieval and Post-Medieval periods. Ireland remained an agricultural country and relied on the export of salted beef and butter, in particular the emerging transatlantic trade. A major project over the past two years has reassessed the material evidence of salt making in the country with an emphasis on coastal sites. The use of sea water in the absence of geological sources of salt was expensive and inefficient, yet provided an important means of securing a commodity of importance. This paper will provide an outline of the Irish Salt project as well as some of its preliminary findings based on survey and excavation activities.

Keywords: Post-Medieval, salt, Ireland, salt pans, salt works, bucket pot, industrial archaeology.

Introduction

The importance of salt in Ireland has long been recognized by historians and archaeologists, however the latter have been slow to examine this commodity in a systematic way as a topic requiring attention in its own right. Despite calls by scholars such as Scott (1981) for increased attention to salt, little work to consolidate knowledge has occurred (see e.g. Kerr *et al*. 2013). Evidence for salt production has more often been presented as an incidental footnote – implied by other forms of archaeological remains rather than encountered directly. For example Françoise Henry's (1952) excavation of an early medieval hut on Inishkea Island produced evidence for the production of purple dye (*purpura lapillus*) on site, which she speculated would also have required the use of salt. In a similar way scholars exploring the early Irish manuscripts (e.g. Kelly 2000) have also brought the presence of salt to the attention of the wider academic community, however little has been done to elaborate on the historical and linguistic implications of such references. Salt production in later eras has seen some historical examination and in this respect the work of Charles Ludlow (1993) is worthy of particular note.

His island-wide study of the industry focused on the 17th to the 19th centuries and provided the historical context, geography, development and decline of the industry. It was of particular importance for the present survey as it provided a baseline of knowledge and sites on which to expand.

More recently combined European initiatives exploring the heritage of salt production have focused on the Atlantic seaboard of the continent (ECOSAL Atlantis, http://ecosal-atlantis.ua.pt/). In Britain the partners in this initiative visited Northern Ireland in 2012 to assess sites of interest based largely on the work carried out by Ludlow (1993). This again highlighted the relative lack of archaeology done in both Northern Ireland and the Republic and the over-reliance on historical enquiry rather than field based work. Few salt making sites are listed in the archaeological site databases maintained by government agencies in either Irish jurisdiction. Those that appear are largely the extant remains of Post-Medieval sites noted by field personnel working on county archaeological surveys or those recorded by maritime archaeologists carrying out coastal surveys. As an island nation, Ireland has a long history of exploiting the sea and shore for fish, shellfish, seaweed, mud, sand and stone. As Ludlow's (1994) initial distribution of salt production sites demonstrated, the majority of works are located in coastal districts. Being too far north to rely on solar evaporation, this distribution reflects the need to win salt by forcing it from seawater, or in combination with seawater, and as such represents the most literal exploitation of the sea. This emphasis on the coast and the sea naturally aroused the curiosity of maritime archaeology – itself a nascent discipline within Ireland – and the current research was carried out by specialists in that field. Another key area contributing to the study is industrial archaeology, and work by specialists in important districts such as Ballycastle (see below) contributed to understanding the wider context of coal exploitation and ancillary industries (e.g. Hammond 1991, McGill 1988, Rynne 2006).

The Archaeology of Irish Salt project

The current project arose in response to the paucity of knowledge and lack of concerted work on salt production. Led by the Centre for Maritime Archaeology (CMA) at Ulster University, it began in 2014 and

proceeded over the following two years. The CMA's attention had previously been drawn to an important series of sites at the north coast town of Ballycastle. This led to the identification of three sites spanning the 17th to early 19th centuries. In 2012, the easternmost site was tested by trial excavation and the walls of the salt-making complex were found. This discovery provided the impetus for further exploration and it was felt a national as well as local examination of salt making was desirable. As such the aims of the project can be summarised as:

1. A national survey to collate evidence of coastal salt-working through cartographic and documentary sources with a view to establishing the scale, centres of production and relationships to ports and markets. On identification a selection of these sites would be visited, assessed and surveyed as appropriate.
2. Further excavation of the 17th century site at Ballycastle in an attempt to broaden our understanding of the nature of the site. In addition to expose, record and take steps to preserve the wrought iron salt pans at the 18th century site at Ballycastle.

As an archaeological survey of salt production sites had not been attempted before, it was decided to work primarily from the Post-Medieval era as a means for establishing a baseline of data in a period where the industry has maximum expression in the historical archives and, it was hoped, the archaeological record. By doing so it was hoped to question some of the existing understandings of the industry and provide some avenues for future work exploring earlier phases of salt making.

Some of the factors specific to Ireland in the Post-Medieval era were efforts to extend commerce to a global market, in particular the transatlantic colonies (Mandelblatt 2007). Unlike neighbouring Britain, most of Ireland was never subject to large-scale industrial development, but nevertheless had a thriving export trade in salted beef and butter which stimulated economic growth from the 17th century (Rynne 2006). The importance of salt stems therefore from its crucial role in the burgeoning provisions trade, which in turn facilitated economic expansion. Nevertheless, the country was subject to tax and import restrictions imposed by Britain. These were relaxed in the early 18th century and historians have regarded the industry as having two principle phases based on this juncture (Ludlow 1993). By tracing the cartographic and field evidence the project hoped to test the effects and scale of this division. In addition, a number of other distinctly Irish practises have been documented that demanded attention in the field. These included combining industrial processes, such as lime and kelp-making, with salt production. Although an inspection of all such ancillary sites was beyond the scope of the project it was hoped to visit at least a representative sample of sites where evidence of these practises could be obtained.

Findings of the national survey

In the course of the national survey the project identified over 400 sites dotted around every coastal county of Ireland and surveyed around 70% of these (Forsythe *et al.* 2021). In many cases, and in parallel with the industry elsewhere, the sites of salt production were re-purposed (particularly in urban environments), destroyed, rendered unrecognisable or were difficult to locate accurately. Those that had been abandoned were sometimes robbed of building materials, or were completely overgrown as nature reclaimed them. In a few cases, however, substantial built structures survived, allowing us at least a partial glimpse into the architecture and structural components of a Post-Medieval salt working site. These sites demonstrated the varied nature of the industry in Ireland, ranging from (literally) a cottage industry through to purpose-built complexes with a pan house, stores and accommodation.

In the 17th century a number of sites around the Irish coast (Antrim, Down, Dublin and Wexford) were making salt. As no sources of rock salt or brine springs were known, the works were heavily reliant on the labour-some and inefficient process of extracting salt from sea water. With a ratio of six tons of fuel to produce one ton of salt, the lack of convenient and inexpensive sources of fuel throughout the country hampered the industry (Whatley 1987: 9). There had been progressive deforestation throughout the century and although peat would eventually be used in some districts the key fuel was coal. Unfortunately Ireland had few coal fields in comparison to neighbouring Britain – a key factor in its failure to industrialise. The sites that do emerge are either in the direct vicinity of rare coal fields (e.g. Ballycastle); close to major ports transhipping the commodity (e.g. Dublin); or those localities with long-standing connections to coal-rich areas. An example of the latter is sited at the harbour of the fishing village of Slade in County Wexford. Dating to the 1680s, it was worked by William Mansel, a Welsh entrepreneur with links to salt-making activity in south Wales (Colfer 2004: 150). An established connection between this area of south Wexford and Wales was already established prior to Mansel's works, as Welsh coal was imported for the nearby Hook lighthouse – the earliest example (13th century) in Ireland. The salt works is the best preserved 17th century site in the country and consists of a building-complex with a series of corbelled vaults

Figure 1. The 17th century salt works site at Slade, County Wexford.

connected by east-west corridors, as well as a pans house with roof aperture and a two-storey, corbelled building that may have functioned as a dwelling (Figure 1). A circular structure to the south is likely the base of a windmill used to pump seawater into a cistern. A similar arrangement has been noted at the site of St Monans in Scotland (Yeoman 1999).

A further 17th-century example is located at Carlingford in County Louth, where Col. Cooke leased a salt works in 1667 (Johnston 2009). This site demonstrates the benefits of repeat survey as well as revisiting past archaeological investigations. Salt pans at Carlingford are marked on a map made in 1693 by Captain Greenville-Collins. The feature appears to be a large pond, and although the map is not to scale it is very prominent in the landscape. The area it occupied corresponds roughly to wet or marshy ground shown on a more modern map. It had been suggested that the feature might represent solar salt pans used to strengthen the brine before boiling, although this seems unlikely. It was clear that the works must have been located toward the coastal edge of this pond; and in the grounds of the 18th-century Ghan House the fresh water sluice mentioned in Cooke's lease was located. In 1993, while an ornamental pond was being created in front of Ghan House, archaeologists discovered a stone lined watercourse running to a rectangular reservoir (2.5x>4.5m). In addition, a further wall, mortar layer and midden were found to be broadly contemporary, while the ceramics and glassware recovered were dated to the 17th and 18th centuries (Gibbons 1994). It is highly likely that the house lies on the 17th-century salt works and the reservoir feature (originally interpreted as a bathing place) operated as storage facility for seawater.

In 1702 the English parliament lifted the tax on rock salt being imported into Ireland. This provided a significant impetus to salt production in Ireland, which became more pronounced as the century progressed. By 1750, 10,000 tons of rock salt were imported, rising to 20,000 by the end of the century (Hammond 1998). The increased salinity gained by combining rock salt with seawater reduced fuel consumption to one ton of fuel for one ton of salt. Besides native and imported coal, peat was also employed in rural areas – notably the west. In common with other industries in the 18th century some works are little more than cottage industries. Combining family quarters with convenient access to salt water, they are almost inevitably found in rural districts. Examples include Doagh in Donegal, where an extended farmstead is sited above a small bay. The farmstead mainly comprises accommodation or outbuildings, but the remains of a further building above the beach likely represents the salt pans. At *Teach an tSallin* [trans: salt house] in Galway the remains of an extended cottage featuring at least four apartments with windows overlooking the waterfront would imply an even smaller arrangement. In addition to many rural salt works, the 18th and 19th centuries see a profusion of urban examples. These reuse existing buildings or are purpose-built. In Ennis, County Clare a 15th-century town house functioned as a salt works for a time in the 19th century. Some of the more important centres were naturally located around larger port towns such as Cork. The city had a

particularly important role in the provisioning salted beef and butter for transatlantic markets. Shandon Parish was the termini for a number of drover's routes bringing cattle to market and contained a series of sites for their slaughter, processing, and by-products, including salt works, tanneries, glue manufactories and a butter market. Where salt facilities survive they are two-storey warehouses with wide, arched doorways fronting the street. Larger complexes resembling factory-scale production also begin to appear, such as Ferrybank in Waterford. A stave and timber yard was established at the docks with salt works importing rock salt from Liverpool. This complex serviced Waterford's trade with the fisheries of Newfoundland in salted pork, butter, bread, flour, soap, porter, candles and salt (Mannion 1988).

Poor survival rates in urban areas inevitably skew our view of 18th- and 19th-century sites toward rural examples. These vary from those where discrete areas of industrial activity seem absent, such as the cottage sites mentioned above, to sites where clear division between residential and production areas are apparent. Apart from the pans house there is a room for the cistern and pump, and various stores for fuel, rock salt or the finished product. In some of these rooms remnant features provide clues to their function, in others the function remains obscured. In some sites the residence of the salt master survives and would appear to show varied status in terms of scale and build features. At Streamstown in Sligo a substantial complex of buildings includes a two-storey dwelling house with slate roof and red brick fireplace. The scale and features of this residence imply the complex was a valuable concern and the salt master of considerable social standing. In other cases, such as Ray in Donegal, the residence is a single-storey one roomed building which would imply a less generous benefactor or profitable facility.

One Irish innovation of the 18th and 19th centuries was the production of salt in combination with kelp and lime. The establishment of boiling pans over simple kelp kilns was proposed as an efficiency, although these small structures would never have produced more than a modest quantity. Nevertheless, there is documented evidence of this being trialled in new kiln designs (e.g. Forsythe 2006: 226). By using the heat generated by the larger lime kilns the process promised to be more productive and was this first documented in 1757 (Ludlow 1994: 67-68). The survey identified a number sites – both rural and urban – where lime works also produced salt, however not all lime kilns could be visited. Individual examples, such as Killylough in County Down, did note lime kilns in the vicinity of salt works with modifications above the pot that may have supported salt pans.

Excavation findings

Special attention was given to three sites in Ballycastle Bay in County Antrim (Forsythe *et al.* 2018). The town of Ballycastle is a rare example of a small Irish town that successfully developed a number of industries in the 18th century. A combination of coal reserves and the activities of particularly energetic local figures led to the emergence of salt, coal, glass and ropeworks in the area (Dallat 1974; 1975). Prior to the expansion of industrial activity in the 18th century, coal and salt production had been underway. While it is difficult to accurately pinpoint the earliest exploitation of these resources, documentary references in the form of a will of Randal McDonnell indicate that they were in operation by 1629 (McGill 1988). Mid-17th-century maps, such as the Down Survey mark two 'Salt Pans' in the Bay and these locations (Ballyreagh and Tornaroan) proved to be remarkably accurate when tested through field visits. A further site (Broughanlea) emerges in the 18th century and survived through to the early 19th century.

The salt working sites were relocated by the identification of seawater reservoirs carved into the intertidal rock. These filled with sea water during high tide and were closed via a sluice gate, providing a ready supply of water for the works at all times. Similar reservoirs, or 'bucket pots' have been observed in Scotland (Yeoman 1999) and it had been assumed that these were a solely Scottish influence. The national survey work, however, did find other rare examples in Carlingford (see above) and documentary references demonstrate that they were employed in Dublin Bay (Kinahan 1907: 122).

In 2014 the trial excavation at the 17th-century site at Ballyreagh was expanded to expose an entire room of the complex (Figure 2). The salt works building was a drystone, double-boulder construction utilising existing beach boulders at two corners. Each wall abutted the next at the corners rather than featuring interlocking quoins, which would have produced a weak structure and indeed this was evidenced by the west gable having collapsed into the structure. An absence of roofing material suggests it was thatched or turf roof, or wooden covering. There was no sign of a fire pit (although coal was plentiful), nor any structure associated with supporting the pans. Rather the occupation level had a spread of coal and waste in the form of clinker or bass. This seems to indicate that this part of the building was used to work on tools or pan repairs or simply to store fuel. Excavation revealed that the wall continued beyond the western corner demonstrating that the room was one part of a larger complex – this likely lies to the rear of the site within the (unexcavated) hill slope.

Finds were extremely sparse from the working surface and construction phases. One fragment of a clay pipe, animal bone (some butchered) and teeth, and a broken gunflint. In addition, reused in the walls was the quern stone as well as another carved stone possibly used as a drain. The broken quern stone was obviously carried on to site to perform a function prior to being damaged, however it is unlikely that cereals were being processed here and the size of salt crystals is usually controlled by the boiling process. The nearby bucket pot is undoubtedly a Scottish influence, however it only fills on the last hour of a rising tide, which raises questions about its capacity and effectiveness given the labour involved in constructing it (Figure 2).

Randal McDonnell (d.1636) was the first earl of Antrim. He at first sided with the Ulster septs, or kin groups, in the struggle for political control of Ireland but later became an enthusiastic supporter of James VI of Scotland, later James I of England. In doing so he retained his estates in Ulster despite his Catholicism. McDonnell's territories were outside the official plantations, yet he would sponsor his own unofficial plantation across northeast Antrim with Crown support. He attracted Scottish and English families to the town he built at Dunluce in 1608 and rebuilt a series of other towns and villages across his lands. He also gained licences for markets and established a fair at Ballycastle and an export trade in agricultural produce. The poorly built and materially impoverished site at Ballyreagh would seem to indicate that it was established by individuals with little expertise in masonry construction and with a limited material culture. His Scottish kinsmen would have been familiar with the bucket pot, although its position on the narrow tidal range of north-east Antrim rendered it less productive than elsewhere. A brief survey of exports from McDonnell's estates in the early 17th century show that livestock was more important than salted meat and it may be that the Earl was adapting to modernity by constructing a salt works but with limited effectiveness (Hunter 2012). His new town at Dunluce was similarly grand in ambition but ultimately doomed (Breen 2012). In civilizing his 'rude' part of Ireland he was commended by the court but it may be that much of his industrial activities were both superficial and aspirational at a time when society was still volatile. In 1641 William Erwin and his wife were killed at the salt pans in Ballycastle by Turlough Og O'Donnell and Phelim O'Boyle (TCD 1641). The rebellion of that year occurred for many reasons, including local grievances, and we may speculate what resentment a salt works established by the native populace and then transferred to British tenants may have aroused.

The Ballyreagh salt works would seem to indicate a stuttering start to industry and modernisation on the north coast of Ireland, but one caveat is needed for this preliminary interpretation. We have uncovered only one part of a larger complex and more could be revealed in future illuminating the true scope of McDonnell's scheme.

Figure 2. Aerial photograph of the excavation at Ballyreagh showing part of the salt works complex and the sea water reservoir.

Nevertheless, the evidence to date shows that this was a site that was poorly constructed, would have been operationally limited and was a weak imitation of more successful industrial practices being conducted elsewhere.

The Broughanlea site was in use from probably the second half of the 18th century to 1823. It gave its name to the nearby Salt Pans colliery – coal continuing to be the key fuel; and the Pans Rock, which features the intriguing 'Devil's Churn'. The site was rediscovered through the action of the sea, as winter storms uncovered the iron evaporation pans. This had, in the past, undermined about half of the site leading to the pan splitting and was partially collapsed. A small wall had been erected around the pans in the 1960s; however sea action continued to impact the site. Enough of the pan was uncovered to justify its identification and further work – to date it is the only known surviving Irish example. In contrast to the 17th-century site, the site featured remnants of the surrounding complex, the pans and supporting structures, artefacts and greater cartographic and documentary evidence.

The site is shown on a number of estate and colliery maps from the 1780s on; Ayre's (1817) map is the most useful and depicts a series of buildings around an open yard. The building housing the surviving pans is illustrated with a pipe leading to a square feature to the east (Ayre 1817). Originally we considered this to be the Pans Rocks features, placed here due to being on the edge of the document. However, closer inspection of the foreshore demonstrated that there was indeed a bucket pot in this location. The area here has been heavily impacted by quarrying for the Ballycastle church rebuild in the late 19th century and as a result only part of the bucket pot has survived, while the range containing the pan was partially dismantled and undermined. On some salt working sites (e.g. Slade) a windmill seems to have been used to pump water from the sea into the pan house. There is no evidence of this at Broughanlea, instead perhaps the open yard featured a horse gang for the same purpose.

The wrought iron pans themselves are over 5x5m in size and made of a series of rectangular plates riveted together (Figure 3). These may have come from the Carron Company in Glasgow, the source of other plates imported to Ireland in this period (PRONI MIC500/14). Four distinct quarters have been fabricated, reinforced by two bands of wide plates across the middle of the pan. Quite clearly repairs have been made over the lifetime of the pan – making salt from seawater and rock salt was notoriously hard on the pans. They had to be regularly scraped clean and often were out of action for repairs (see Whatley 1987 for useful comparison). The patches appear to comprise iron bars riveted onto the junction of the plates, as well as larger square plates set onto the pan. Along the northern edge a portion of brick wall was revealed, running at an angle under the split pan. This is likely the remains of one of two opposing brick pillars that would have provided access to the fire pit below.

Figure 3. The exposed wrought iron salt pans at the Broughanlea site, Ballycastle.

Cobbles that displayed heat damage and pitting ran into the fire pit and other vitrified stones were noted under the pan. At the base of the wall partially burnt coal – white at the edges – was recovered sitting on sand.

The Broughanlea salt pans are a remarkable survival given their location. Once the industry ceased to operate their size and the labour involved in their dismantling led to abandonment and burial. Our final task at this site was the replacement of the surrounding wall with a more effective protective barrier from the sea and the reburial of the site.

Summary

The Archaeology of Salt in Ireland project marks the first attempt to come to terms with a ubiquitous item of life and economy in Post-Medieval Ireland. The project has reassessed upward the number of salt works operating across the country in this period with a clear expansion in the 18th century and a persistence of the industry into the late 19th century after the discovery of native sources of rock salt. Today rock salt continues to be exploited in Antrim for the purpose of road gritting. The excavation work has revealed for the first time a portion of a 17th-century salt-working site and recorded in detail a salt pan dating to the period of expansion in the industry in the later part of the 18th-century. The work undertaken has produced new insights to this fundamental economic activity yet remains the only the first stage in addressing it.

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References

Ayre, W. 1817. *A chart of the collieries near Ballycastle describing dykes state of the works, etc., in Aug. 1817*. Boyd Estate Office.

Breen, C. 2012. *Dunluce Castle: archaeology and history*. Four Courts, Dublin.

Colfer, B. 2004. *The Hook Peninsula*. Cork University Press, Cork.

Dallat, C. 1974. Ballycastle's glass industry. *The Glynns* 2: 28-32.

Dallat, C. 1975. Ballycastle's eighteenth century industries. *The Glynns* 3: 7-13.

Forsythe, W. 2006. The archaeology of the kelp industry in the northern islands of Ireland. *International Journal of Nautical Archaeology* 35, 2: 218-229.

Forsythe, W., McConkey R. and Breen, C. 2018. Persistence and risk: salt production in post-medieval Ireland. *World Archaeology* 50, 4: 603-619.

Forsythe, W. McConkey, R. & Breen, C. 2021. The Archaeology of Salt Production in post-medieval Ireland. *Post-Medieval Archaeology* 55, 1: 91-108.

Gibbons, E. 1994. *Liberties of Carlingford, Ghan House Excavation, 1993*. Unpublished Report, National Monument Service, Dublin.

Hammond, F. 1991. *Antrim Coast and Glens: Industrial Heritage*. HMSO Books, Belfast.

Hammond, F. 1998. Water and weed: the exploitation of coastal resources. *Ulster local studies* 19, 2: 60-75.

Hunter, R. J. 2012. *The Ulster Port Books 1612-15*. Ulster Historical Foundation, Belfast.

Johnston, D. 2009. Two pre-Ordnance Survey maps of Carlingford. *Journal of the County Louth Archaeological and Historical Society* 27, 1: 8-25.

Kelly, F. 2000. *Early Irish Farming*. Dublin Institute for Advanced Studies.

Kerr, T. R., McCormick, F. and O'Sullivan, A. 2013. *The Economy of Early Medieval Ireland. Early Medieval Archaeology Project (EMAP 2) Report 7:1*.

Kinahan, G. H. 1907. Notes on Mining in Ireland. *The North of England Institute of Mining and Mechanical Engineers Transactions* 54: 105-123.

Ludlow, C. G. 1993. *A history of salt in Ireland with special reference to the salt manufacturing industry*. Unpublished PhD thesis, Queen's University Belfast.

Ludlow, C.G. 1994. Refining of imported rock salt in Ireland in the eighteenth and nineteenth centuries, *Journal of Salt History* 2: 57-70.

Mandelblatt, B. 2007. A transatlantic commodity: Irish salt beef in the French Atlantic world. *History Workshop Journal* 63: 18-47.

Mannion, J. 1988. The Nevins Family 1800-1840. *Decies* 37: 9-20.

McGill, D. 1988. Early saltmaking in Ballycastle district. *The Glynns* 16: 17-21.

Public Record Office of Northern Ireland (PRONI) MIC500/14. Letter from John Clarke, Dublin to John Foster 13/1/1785.

Rynne, C. 1999. *The industrial archaeology of Cork city and its environs*. The Stationary Office, Dublin.

Rynne, C. 2006. *Industrial Ireland 1750-1930: an archaeology*. The Collin Press, Cork.

Scott, B.G. 1981. Some conflicts and correspondences of evidence in the study of Irish Archaeology and language. In Scott, B. G. (ed.), *Studies on Early Ireland: essays in honour of M.V.* Duignan: 115-119. Association of Young Irish Archaeologists, Dublin.

TCD 1641 Depositions Project, MS 838, fols 074r-(http://1641.tcd.ie/deposition)

Whatley, C.A. 1987. *The Scottish salt industry 1570-1850: an economic and social history*. Aberdeen University Press, Aberdeen.

Yeoman, P. (ed.) 1999. *Salt and coal industries at St Monans, Fife in the 18th and 19th centuries.* Tayside and Fife Archaeological Committee, Monograph 2. Glenrothies.

The Vall Salina: More than 6500 Years of Halite Exploitation. Cardona, the Salt of History

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Abstract

This paper is a synthesis of the work done in the Vall Salina, especially the excavations in 2007 and 2008, which shows that the exploitation of the salt of Cardona has been uninterrupted for 6500 years, from the Neolithic today. This work is the result of the participation of archaeologists, historians, geologists, geographers, biologists, physicists and architects. The Vall Salina is located in the town of Cardona (Catalonia), a space of almost 2 km long and 0.2 to 0.7 km wide. The valley is oriented from southeast to northwest. It is located between the Castle and the village to the north and the "la Serra de la Sal" in the South. To the southwest is located the diapir of the salt mountain. This diapir is unique in all of Western Europe. The outdoor exploitation (terraces exploitation system) was the system that was used until the early twentieth century, when underground exploitation (exploitation wells and galleries) began. In this paper, we analyse the evolution of the production system running from exploitation of common property resources 6500 years ago to a controlled operation from the final Neolithic-Chalcolithic.

Keywords: Contemporary history, Medieval period, Modern history, Prehistory, Roman Empire.

Introduction

Surprisingly, salt, a natural resource so important to man, has not attracted the interest of historians and archaeologists Catalans until relatively recently. The raison d'être of Cardona is not the medieval castle but the salt that was exploited five thousand years before its construction, and the lords of Cardona were not the only ones who have controlled this valley of salt. We are facing a problem on the conception of the importance of history, the positivism and the lack of historical perspective.

We must remember that the history of events was consolidated in the nineteenth century and its influence lasted over time (Carr 1987: 57). Obviously, the absence of salt in the material means that there is no empirical knowledge of the topic. This results in empiricism denying any source of knowledge different from the sensitive knowledge. Therefore, it is the historian who decides the facts belonging to history (Carr 1987: 58), and the easiest solution is not always the most correct. What disappears irreparably are the unexpressed thoughts and the intentions not carried out (Childe 1982: 11) and not anything related to the exploitation of salt; all we have to do is looking for it and knowing how to interpret it.

However, how do we build history? From what data do we build history? These questions have conditioned much of the history of Cardona. Depict means to interpret (Carr 1987: 78). Understanding is not a passive attitude (Bloch 1988: 112). As noted by V. Gordon Childe, written history involves a very fragmented and incomplete story about what happened (Childe 1985: 19). Therefore, archaeology begins as a classificatory science; once data are classified we can begin to interpret them (Childe 1982: 14). It is the historical analysis where the historian must understand but not judge. (Bloch 1988: 108). So far, the treatment of the history of the salt of Cardona has been biased and incompletely analysed. The data provided by documentation, whether textual, graphical or archaeological have not been interpreted.

Moreover, we come up against the problem of the historical perspective, the most recent knowledge as the most important for understanding the current reality. Thereby, we can fall into the trap of understanding that the nearly 70 years of exploitation in galleries of the Saline of Cardona are the most important in the history of Cardona and, therefore, abandoning the historical impartiality and giving judgment (Bloch 1988: 108).

Since 2004, a research project has analyzed the activities carried out within the Salina Valley and the dynamics generated by this exploitation over time.

The project is promoted by the Institut de recerques envers la Cultura (IREC) with the cooperation of the Laboratoire Trajectoires CNRS (Paris). It was established by an interdisciplinary team of Archaeologists, Architects, Biologists, Engineers, Geologists, Physicists, and Historians.

Why such a diverse team? Because the working competence of an interdisciplinary team is necessary to provide a wide variety of data which enable us to deal in greater depth, and an historian is not a specialist in other sciences (Carr 1987: 163).

The communication presented is a first approach to the historical evolution of the exploitation of the rock salt of the Salina Valley. „History is an endless dialogue between past and present" (Carr 1987: 86). We begin to overcome the problem of historiographical synchronization between a reductionist and positivist history which is the past with a conception centered in the study of the relationship between the socio-economic activity and the socio-economic system. This is the first publication focused on emphasizing the importance of salt as an economic driver of the communities and population settled throughout history in the surroundings of the „Salí", at present the municipality of Cardona.

With regard to Cardona, there is a concentration of rock salt, sylvinite, carnallite and plaster which, depending on the historical period, have attracted an intrinsic economic interest. Nevertheless, we depart from the assumption of the theory of value-utility, in which is centered all the economic analysis around the phenomenon of exchange, this being the mechanism by which economic needs are met and goods are exchanged as useful items to meet them (Mochón, 2005). „One of the few undisputed laws of history is that the luxuries tend to become needs and generate new obligations" (Harari 2015: 133).

Situation of the Saline Valley

The municipality of Cardona (Bages) is located in the extreme NE of the Iberian Peninsula, in the centre of Catalonia, in the NW of the Bages region, in the Cardener Valley. On the right side of the Cardener, salt and potassium sediments emerge in a landslide south of the village, which is located in an anticline.

The Saline Valley (Figure 1) is located in an area of almost 2 km long and 0.2 to 0.7 km wide. The Salí is oriented southeast to northwest. The valley is enclosed between the Castle and urban area to the north and Tresserres to the south. The salt diapir of the Muntanya de Sal is located in the southwest. The altitude of the Vall Salina ranges between the 391 and 533, the lowest point being the Pla de la Sal near the river Cardener and the highest point the top of the diapir. The mining rock salt deposit presents a dense layer of halite, sylvinite and carnallite sinking and located between 700 and 1200 m. The upper layers are sandstone and marl.

Geographical situation: 31 T 390101 4639985 (Salt Mountain) and 31T 391056 4640649 (Saint Onofre east).

Peculiarities of the Saline Valley

The morphology of the Saline Valley is a very peculiar result of natural and anthropogenic action. The solubility of the materials is the cause of the extraordinary transformation of the landscape of both the Salt Mountain and the valley (Fíguls et al. 2007a: 201). This transformation is due to, on the one hand, the surface erosion (favoured by the solubility), causing a clay waste, forming a "cap" above the salt formations (cap rock to seal rock in geological terminology). On the other hand, there is an underground erosion, with the formation of cavities that, when sinking, make up sinkholes (cops in local parlance). These two circumstances (the superficial and the underground) have contributed to the continuous transformation of the landscape throughout the Quaternary period, the historical times or the present.

These changes affect actively in the deposition and preservation of archaeological remains. Thus, the hill of Saint Onofre is a cap rock covering the rock salt of the hill, being very fluffy sediments with no statigraphy (neither archaeological nor geological). Any human activity (agriculture) or natural (settlement pins) exacerbates the effects post depositional movements (vertical movements, horizontal movements, conservation...), which are another difficulty to overcome.

Prehistoric exploitation of salt in Cardona

Inside

Salt outcrops and Middle Neolithic

The beginning of salt exploitation in Cardona is situated around 4500 BC, during the Middle Neolithic. The spatial distribution of Neolithic settlements in Catalonia, between Pre-Pyrenees and Central Highlands, shows a concentration of communities in the vicinity of Cardona and the river Segre (c. 4500-3500 BC).

Through 12 collections, more than 200 stone tools have been analyzed from the Vall Salina. Eight are private, two public (Salt Museum of Josep Arnau and Municipal Museum of Cardona) and two come from our surveys in 2007 and 2008 (Figure 2).

86% are extraction tools and 80% are axes, adzes, chisels and picks. They have been gradually used in percussion on the salt outcrops in order to obtain salt blocks. These stone tools present conchoidal fractures, crushed areas, splinters areas and scars. The cutting edge is thick with rounded distortion. All these tools are recorded directly at the foot of the salt emergences. Six percent of these extraction tools lack a handle. The use-wear traces indicate direct percussion (lenticular splintering and regular fracture) and indirect (irregular splinters).

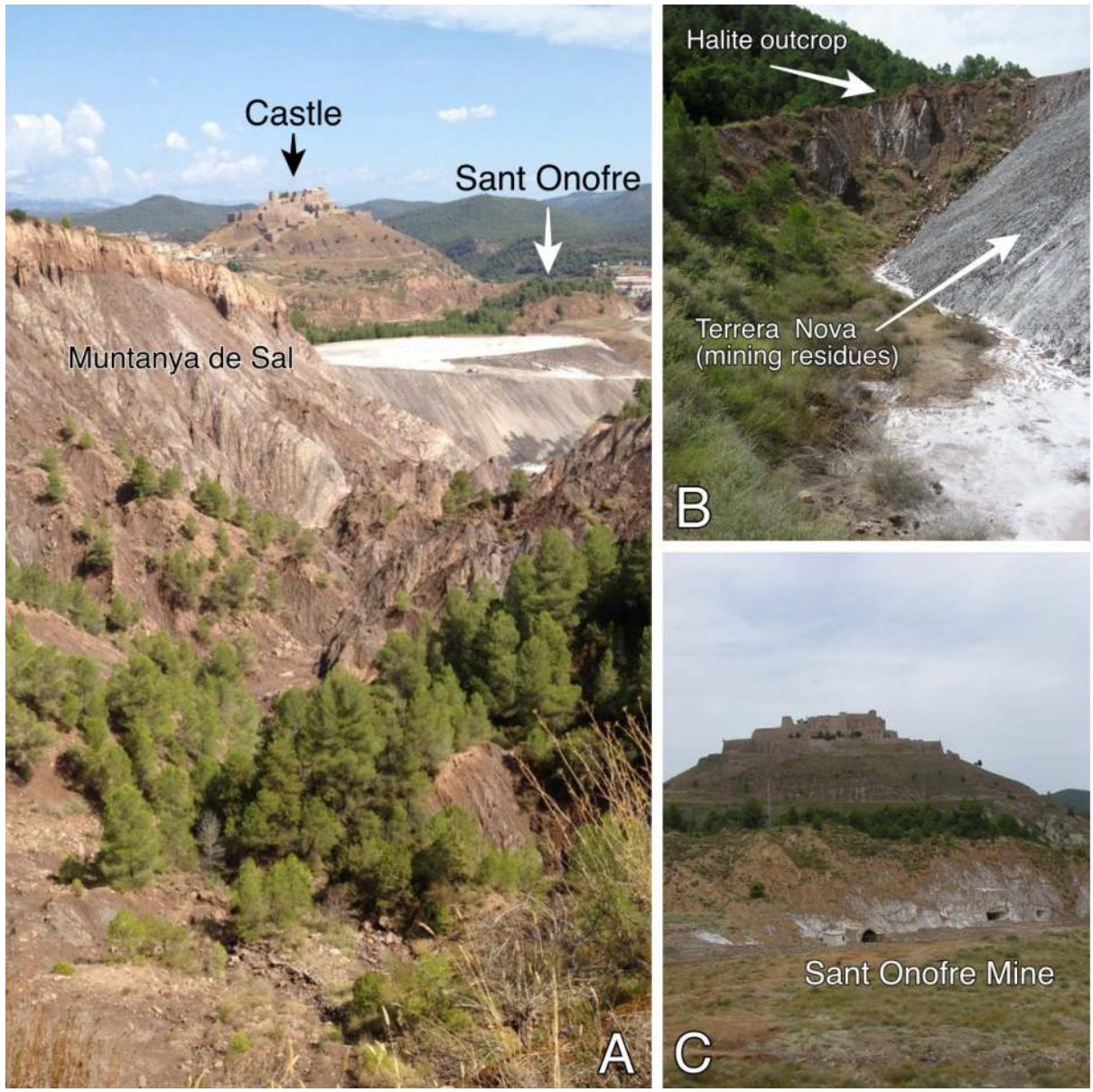

Figure 1. (A) View of Vall Salina from Bòfia Gran. (B) Halite outcrop and mining residues. (C) View of the Sant Onofre Mine. (Photographs: Alfons Fíguls).

There is only 6% of the full set, mostly pestles, involved in the transformation and the preparation of salt. They come from ancient tools, about 50% reused (stone axes). The use-wear analysis suggest direct percussion (uniform and homogeneous crushed and splintered areas) produced by shredding, grinding or/and shaping the amorphous salt blocks.

The 7% remaining correspond to woodworking tools (felling and shaping). This low rate suggests a disinterest in forest felling and must be connected with the wood pieces for mining.

In all the Catalan Central Depression there are no igneous and metamorphic rocks. Therefore, except the sedimentary material, the raw material and/or the stone tools, completed or half-finished, come from the border or outside this territory occupied by the "Solsonià" communities. Probably not all artifacts come to Cardona as a finished product; two axe preforms and two bush hammers have been registered in the collections.

With this earliest rock salt extraction, the communities living around Cardona were able to attract and import exogenous material and specific values (variscite pearls, shells bracelets, flint from the Provence-Vaucluse, alpine axes). The rock salt production involves the intercommunity connections and reaches the major axes of privileged exchanges, at least at the regional scale.

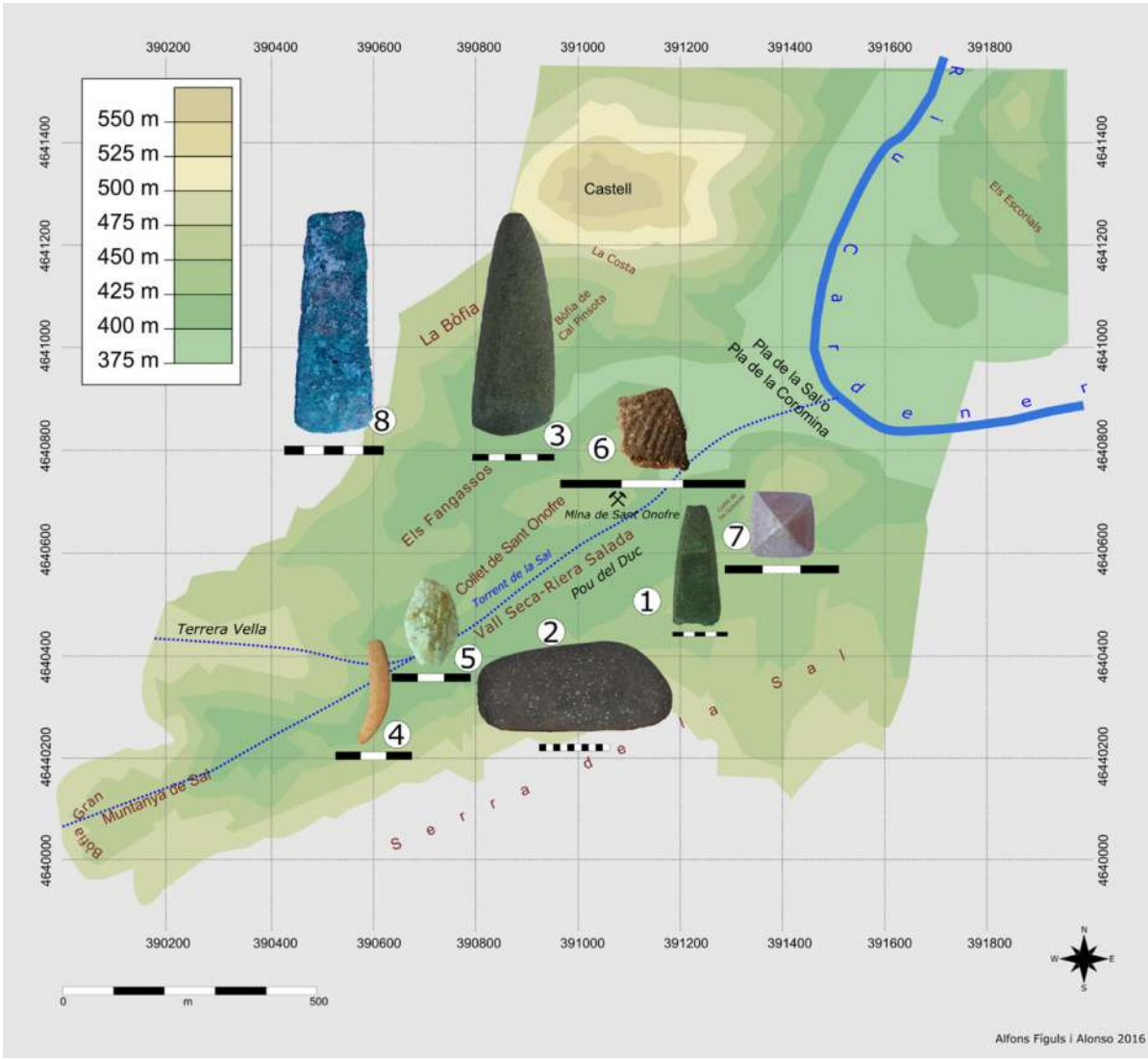

Figure 2. Distribution of the most significant prehistoric findings in Vall Salina: (1) Stone axe reused for salt extraction. (2) Large mining hammer weighing 11 kg. (3) Stone axe used in wood-related work. (4) Glycimeris bracelet. (5) Leaf-shaped arrowhead, typical of the late Catalan Neolithic. (6) Campaniform pottery fragment. (7) Pyramidal bone button. (8) Flat bronze axe. (Map and photographs: Alfons Fíguls).

Late Neolithic

In the extreme south-western part of Sant Onofre, we have a flint foliaceous arrowhead, typical for the Late Neolithic (3500-2500 BC) associated with some sherds. Unlike the Middle Neolithic, where there was no evidence of control in the Salt valley and around, one community settled directly in the Vall Salina dominating the anticlinal, probably to control the salt exploitation (Figure 2).

Chalcolithic and Bronze Age

In the campaign of 2007 a fragment of a Bell Beaker (Figure 2) was documented in Turó de Sant Onofre together with bone fragments. Bell Beakers are considered to widely exceed their utilitarian dimension; a ritual element and a symbol with a strong key role in funeral ceremonies and at the same time a status symbol only available for privileged individuals or social groups (Delibes et al. 2007: 55). In that sense, the model studied in Molino Sanchón could be repeated in Salí. It is possible that the Bell Beaker fragment, related to the elites of power, reflects the elites who controlled the salt from Cardona. Furthermore, the position of this ceramic in a visual point of control over the territory reinforces the interpretation in this sense.

In the upper part of the valley a flat bronze axe and the fragment of the cutting edge of another one have been found, both related to the rock salt exploitation (Figure 2).

Between little depressions in the salt outcrops produced by the flood of rain water, a pyramidal button with perforations in a V and manufactured in bone was found (Figure 2).

Outside

Jade axe

Inside the municipal district of Cardona an axe made of jade has been documented. It should be pointed out that the nearest outcrops of this rock are situated in Monte Viso (Italy) more than 400 km away from Cardona. We have to insist that Cardona is able to attract an economic prestige good that does not exist in its neighborhood and where salt plays an important role as an exchange good.

The spearhead from La Roqueta

The site of La Roqueta, where a fragment of a spearhead with long socket, following the classification established by Coffyn (1985: 386, map 7), was found, is situated about 5 km away from Vall Salina (Schuhmacher and Fíguls 2007). The presence of this element, which is only available by privileged individuals or social groups, can only be understood by the existence of a resource, which allows this exchange, a resource able to generate wealth.

It should be pointed out that we do know three similar pieces from Catalonia, one in the Cueva de Can Sadurní (Begues, Barcelona), one in Pla de Gibrella (Capsec, Garrotxa, Gerona) and another one in the hoard of Ripoll (Garrotxa, Gerona).

From the three spearheads in the hoard of Castromucho (Palencia), two belong to the type treated here. In both cases the blade is short, leaf-shaped and flat. Both have a long socket of circular section and show a hole to fix the shaft.

The spearhead of La Roqueta keeps most of the blade, only the tip is missing, and a large part of the start of the socket. The thin blade with a flat section, today fragmented, originally was quite short and leaf-shaped. The hafting socket extends itself in a very pronounced midrib of the circular section along the whole of the blade and which originally ran until the end of the tip. At the start of the socket we can see two circular perforations for a peg, aligned alongside the cutting-edge of the blade. At no point has the proximal end of the hafting socket been preserved, therefore this should have been a little bit longer than what is seen today (Figure 3).

Iberians

The presence of remains of Iberian time in the Cardona's castle hill is known from the early decades of the twentieth century, mainly from the collection of materials of this chronology conducted by Reverend Joan Serra Vilaró. It is unclear whether it was simply a superficial collection or if therthey were some polls. The archaeological material recovered included ceramic made with potter's wheel, Campanian pottery A and B and basaltic masses. At the beginning of the nineties, explorations were carried out in the castle area which did not allow to document any associated archaeological remains and simply could corroborate, with the superficial collection of Iberian ceramics, the existence of the settlement pointed by Serra Vilaró (Solé et al. 1992).

These evidences suggest the most likely occupation of at least one part of the top of the hill of the castle. One hill that dominates the whole Sali and will be occupied from the High Middle Ages onwards, as it confirms one first Population Letter granted by the Count „ Guifré el Pilós", approximately in 888.

Occupation and Roman exploitation

A series of written sources, quoted below, are documented during the Roman period regarding the description of a mountain of salt, related to its possible identification with the salt mines of Cardona.

The first written documentary sources which refers to a „Salt Mountain" or the extraction and use of salt in Cardona date from s. I AD

- Columella (4-70 AD) Lucius refers to a salt mountain in Hispania in his work *Res Rustica*, written around the year 42 AD:

"sive album in oculo est, montanus sal Hispanus vel Ammoniacus vel etiam Cappadocus, minute tritus et immixtus melli vitium extenuat" (Columella, *Rust*. 6, 17, 7)

- Pliny (23-79 AD), who was sent to the Hispania Tarraconensis on 73 AD, describes some of the features of the salt in the Hispania Citerior in his *Naturalis Historia*:

"in Hispania quoque citeriore Egelestae caeditur glaebis paene translucentibus cui iam pridem palma a plerisque medicis inter omnia salis genera perhibetur. omnis locus in quo repperitur sal sterilis est nihilque gignit. et in totum sponte nascens intra haec est. facticii varia genera, volgaris plurimusque in salinis mari adfuso non sine aquae dulcis riguis, sed imbre maxime iuvante ac super omnia sole multo, aliter non inarescens" (Plin., *HN*, 31, 80-81).

- Aulus Gellius (125-180 AD), in his work *Noctes Atticae*, dated on 159 AD, includes information on various topics that had attracted his attention, among which is the Salt Mountain:

"Nam cum de Hispanis scriberet, qui citra Hiberum colunt, verba haec posuit: "Set in his regionibus ferrariae,

Figure 3. Map of the spread of long-handled spears. Pla de Gibrella; Can Sadurní; Ripoll; Cardona; Castromucho; La Represa; Valdevimbre; Sobrefoz; Fonsagrada; Maltravieso; Castro San Bernardo. Salt route: Cardener historic path to the north. Main communication channels of southeastern Iberian Peninsula. Secondary communication channels of southeastern Iberian Peninsula. (Map: Alfons Fíguls, base map: Wikipedia)

argentifodinae pulcherrimae, mons ex sale mero magnus; quantum demas, tantum adcrescit" (Gell., *NA*, 2, 22, 29).

- Sidonius Apollinaris (c.430-488 AD) refers to the salt from Tarraconense. Several authors have mentioned that salt Tarraconense used to be exported to Italia and Gallia (Blázquez 1970: 148; Martínez Muñoz 2001: 140; Meniz 1978: 30):

"Venit in nostras a te profecta pagina manus, quae trahit multam similitudinem de sale Hispano in iugis caeso Tarraconensibus. nam recensenti lucida et salsa est, nec tamen propter hoc ipsum mellea minus, si sermo dulcis et propositionibus acet: sic enim oblectat eloquio quod turbat imperio, quippe qui parum metiens, quid ordinis agam, carmina a nobis nunc novat petat. primum ab exordio religiosae professionis huic principaliter exercitio renuntiavi, quia nimirum facilitati posset accommodari, si me occupasset levitas versuum, quem respicere coeperat gravitas actionum." (Sid. Apoll., *Epist.* 9, 12, 1).

This documentation has been a matter of controversy because there is no unanimity in recognizing Cardona these descriptions (Martínez Muñoz, 2001). There is some agreement in accepting that Aulus Gellius and Sidonius Apollinaris describe the Salt Mountain of Cardona; however, Gaius Plinius Secundus, despite not being yet identified, may refer to La Higuera (Albacete) (Carusi, 2008: 116) or to a mine near Linares (Jaén) (Blázquez, 1970: 148). Without entering into sterile debates leading to nowhere and only generating speculation, we would like to ask two rhetorical questions:

- How many piles of salt had Hispania?
- How many salt mines prove archaeologically a Roman presence?

Throughout Western Europe, there is only one mountain of salt, the one of Cardona.

There is no doubt that archaeological data demonstrate the Roman presence around the valley salt and the valley itself. In Cardona there are 11 Roman archaeological sites, among which it is possible that there were establishments of the Republican era (Solé et al., 1992), corresponding to 10 room locations and 1 oven.

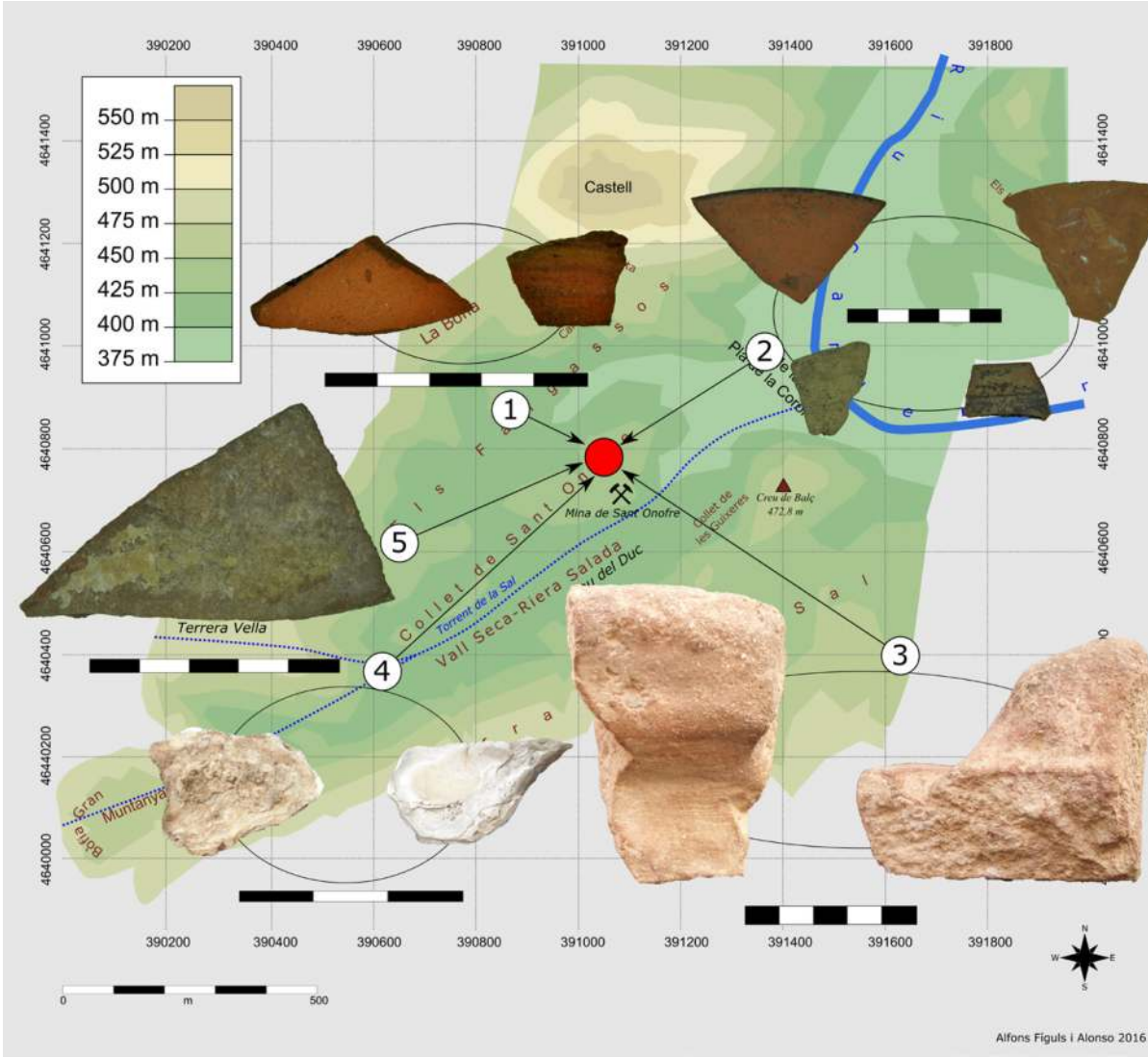

Figure 4: Distribution of Roman findings in Turó de Sant Onofre. (1) Fragments of luxurious domestic ceramics. (2) Fragments of common domestic ceramics. (3) Tegulae. (4) Oysters. (5) Amphora fragment. (Map and photographs: Alfons Fíguls)

Evidences of Roman presence in the valley salt come to light since 1991, when ceramic rests, from the I century to V AD were found on the "Collet de Sant Onofre" (Daura 2001: 93-97). In the campaigns of 2007 and 2008 on the top of San Onofre remains from the same period were documented (Figure 4).

The presence of construction material such as *tegulae* suggests the existence of a permanent establishment in the hill, specifically on the head entrance to the valley (Figure 5). Lacking of a new excavation among the remains of structures documented a virtual reconstruction of a watchtower has been made. The results show that this is a point of control and domination of the valley, that is to say, of any place with outcrops of halite.

Ceramics for daily use have documented the existence of two completely antagonistic groups: on the one hand, household items of common use, that even could be called vulgar, and on the other, ostentation ones. A clear division that could be a sogn of cohabitation in a small area of Sant Onofre of those who represent the command and coordination of the operation of halite and of those who control productive activities.

We would like to emphasize, among the remains of San Onofre, the presence of *ostrae edulis*. The collector center nearest to Cardona was Barcino, which, besides being a center of production of garum, stood out for the quality of its oysters: "*ostrifero super addit a Barcino ponto*", so Ausonius highlighted in his work *Epistulae* (*Ep*. XXIII, 69-70) (Beltrán 2007: 281). Should be noted that the base of garum consisted of a maceration in salt of the bowels of the fish (eggs, blood, guts, guts, etc.) often mixed with small whole fishes (Beltrán 2001: 58). It should not be discarded that the south-north traffic

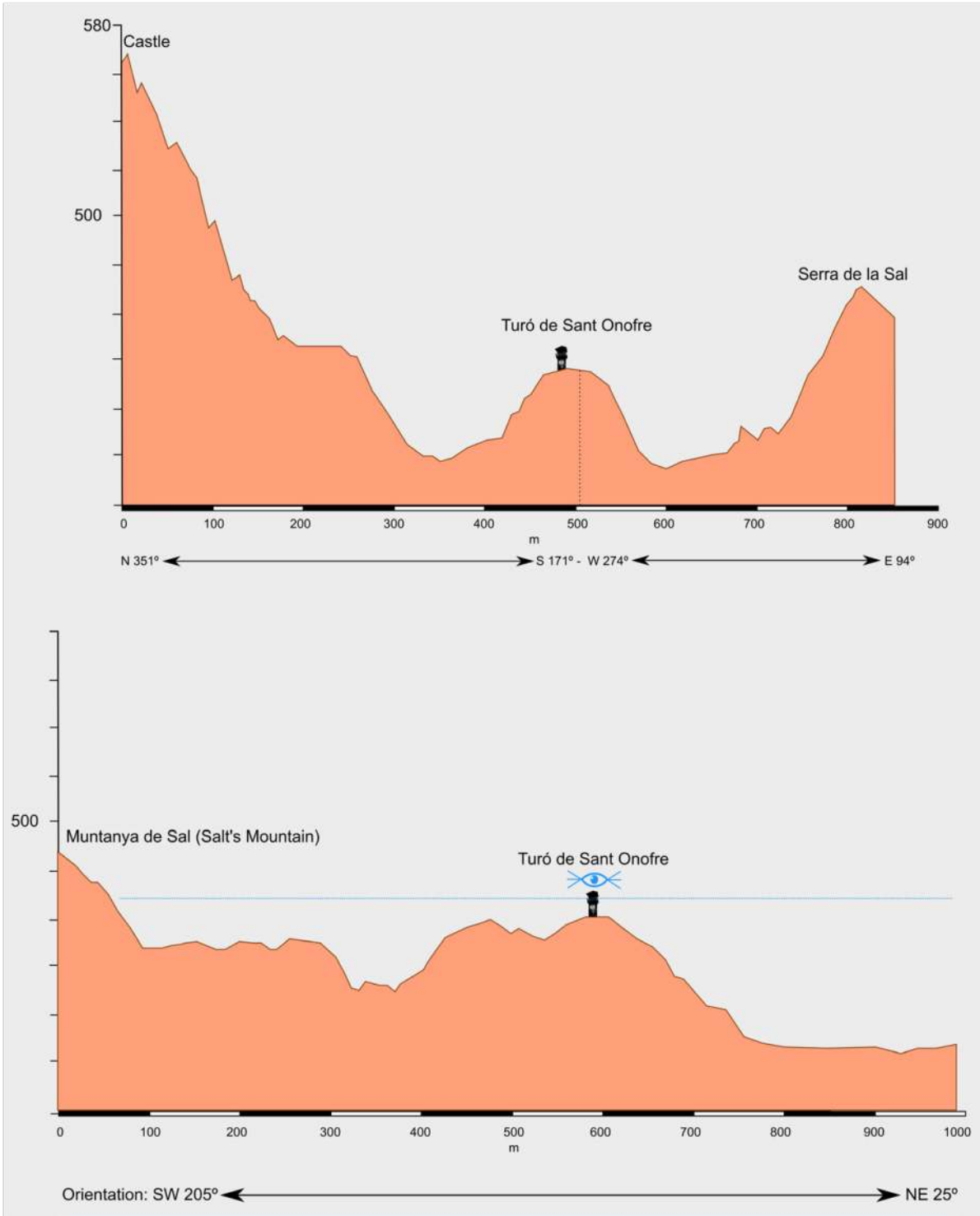

Figure 5: Interpretation of the domain at the valley entrance from the summit of Sant Onofre (Alfons Fíguls).

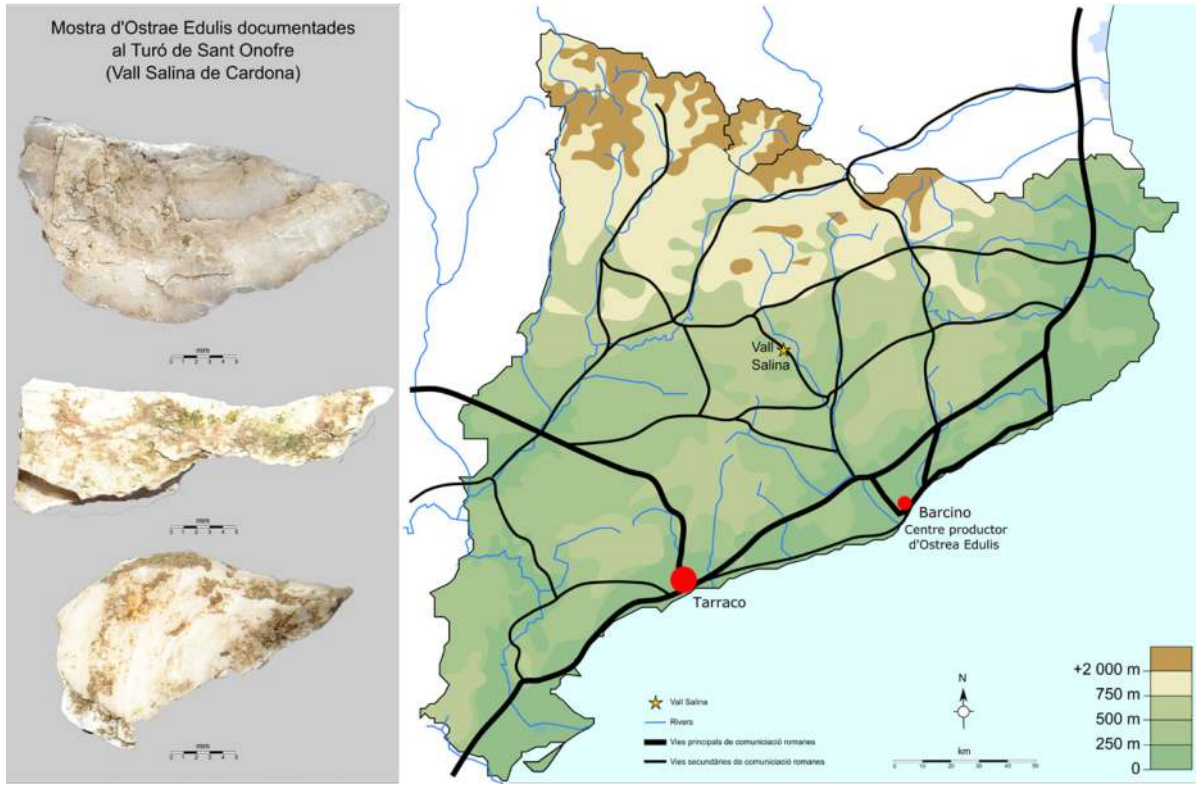

Figure 6: Main Roman roads in Catalonia in relation to Vall Salina and Barcino, a center for oyster production. (Map and photographs: Alfons Fíguls).

of oysters had a reciprocal north-south flow of salt; which was necessary in the work of salting and garum production in Barcino (Figure 6).

"Et ipse die lovis semper illa vestrum de illa sale in omni tempore, sicut fuit ab initio"

Cardona, in the Middle Ages, according to Pierre Bonnassie (Bonnasie 1979: 66), was a «mercatum perfectum», from which the populations of central and southern Catalonia were supplied; It was not a market aimed at satisfying the needs of a wealthy clientele, but was linked to the production and diffusion of salt, a mass-market product, being introduced by an important communication network, such as the Strata Cardonensis from the late 10th century. The profits from the exploitation of salt were shared between the viscount, the monastery of Sant Vicenç and the urban community. In 986, Borrell II, in the Letter of Repopulation, gave to the one who populated Cardona the privilege of: «Et ipse die lovis semper illa vestrum de illa sale in omni tempore, sicut fuit ab initio» (Gaya 1935) and the rest of the week the factory of «Salí» was in the hands of the power of the viscount. As of the 12th century, there was an increase in the production of salt, as a result of an increase in urban consumption and the need for livestock. Cardona was an obligatory stopover for the flocks of the Cistercian monasteries of Poblet and Santes Creus in their transit to the summer pastures of Berguedà, Cerdanya and Pirineus. Cardona was the market for salt in central Catalonia and the importance that the salt market acquired led to the Via Salinaria or «camí de la Sal» (Galera 2007: 574). Inside the valley, pottery has been documented from the Middle Ages to the Low Middle Ages (Figure 7).

The name of "gentlemen of salt", with whom the lineage of the Cardona was known, clearly denotes the significance of the Salí and explains the economic power of the viscount. The power of Cardona turned them into one of the most influential lineages in Catalan politics of the Middle Ages and were the kings without a crown.

The Lords of the Salt: The uncrowned Kings

In the Modern Era, the traditional method of extracting salt was open pit using picks and hoes. Before opening cuts, preparation works consisting in removing lands covering the salt were made. Once cleaned the ground, the extraction of salt was made by steps or benches of the height of a man, and stairs and access ramps were set up. Since the late 18th century, gunpowder began to be used to extract salt in order to save labour and reduce production costs.

During this time, it continued the exploitation of salt intended for transhumance (April-September) and the preservation of meat (November and December) (Galera 2007: 566-567).

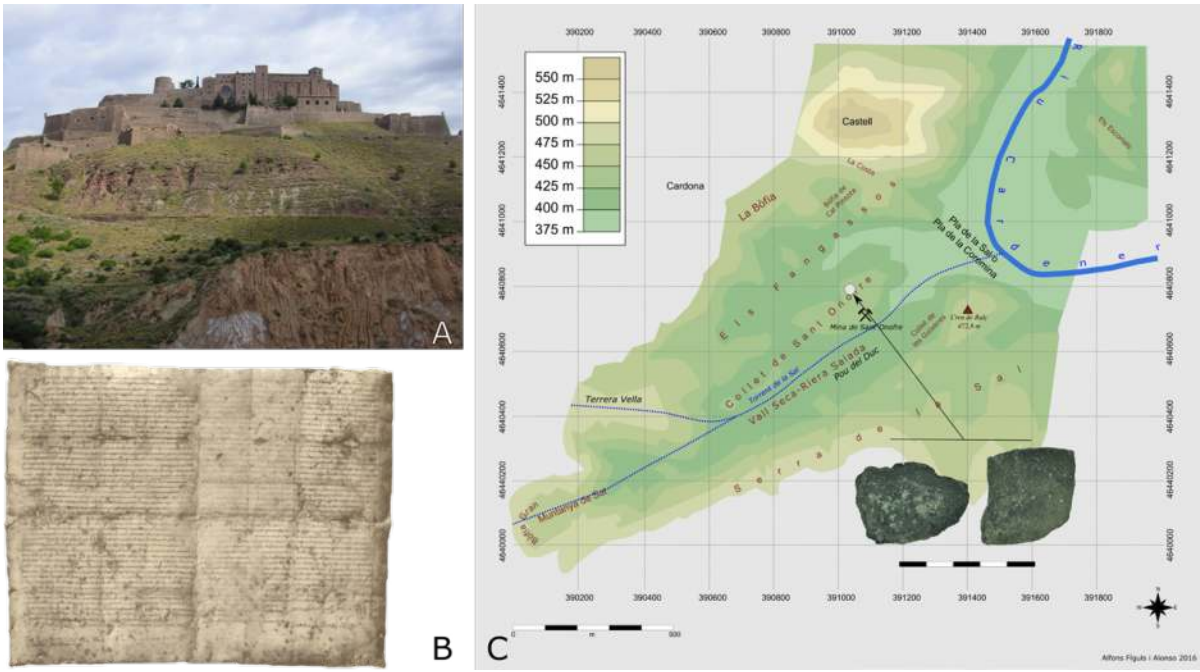

Figure 7: (A) Cardona Castle dominating Vall Salina. (B) Municipal charter of Cardona. (C) Findings of medieval gray pottery in Sant Onofre. (Photographs and Map: Alfons Fíguls, Municipal charter: Cardona Historical Archive).

In 1716, Felip V imposed the "Decret de Nova Planta" and established the salt monopoly putting an end to the free commerce of salt. With this royal monopoly, the salt from Cardona was distributed to the main towns situated at a distance of eight hours away, altering all the dynamics of the previous market (Galera 2007: 564). But, since 1870, the Dukes of Cardona, owners of the salines, were authorized to freely extract and sell. It was the time when it was made a big effort to commercialize again the salt from Cardona.

It is estimated that in the XIXth century 4000 tons of salt from Cardona were destined for human consumption.

From NaCl through KCl

The open-pit system of exploitation remain unchanged over time until the introduction of gunpowder, at the XVIIIth century, and the opening of the "Pou del Duc", the first underground salt mine, opened between 1902 and 1905.

The discovery of potassium salts (1912) transformed Cardona both economically and socially. Doubled the population and there were significant changes in its urban and social landscape.

In Cardona, the exploitation of sylvinite for obtaining potassium chloride (KCl) began in 1929 and lasted until September 1990.

The mining activity of Cardona allowed to obtain un 22% of potassium chloride, the remaining was sodium chloride, carnalyte, anhydrite and other elements (Arnau 2001: 79). This potassium chloride was obtained through the dissolution system (from 1929 until 1972) and then with the flotation system (from 1967 to 1990) where the potash was separated from the rest of the mineral obtaining a law of 95% KCl. The remaining waste was sent to the deposits of salt (larks) and one part was purified to obtain industrial salt destined mainly to the chemical industry to obtain chlorine for the production of plastics.

When the exploitation of the potash started, rock salt went to second place. From 1929 to 1990, about 28 million tons of halite were extracted.

From 1929 to 1990, more than 17.215.00 m3 were extracted, i.e., 37,874,843 tons of mineral, and the exploitation reached the 1,308.7 meters deep, being the deepest mine in the country.

Capitalization

With this article, we would like to help put an end to the idea, among economic historians, that preindustrial societies failed to meet their most basic needs (Cipolla 1983: 77-78).

If the exchange operations play a strategic and dynamic role, which allows the specialization and the best use of available resources (Cipolla 1983: 78), the vision we have of the prehistory of Cardona, based on objective data, is that salt has played a fundamental role in meeting the needs of productive activity: capital goods

(metamorphic and bronze stone axes) and social needs, such as the ax of jadeite and the spearhead of La Roqueta.

We believe that the need of salt for human and animal consumption and as „useful-value" was an economic and demographic catalyst. The analysis of the population from the Neolithic and the network of exchanges shows that the demographic and economic levels were more significant around the Salt Mountain than in other parts of the interior of Catalonia.

Of the two interventions carried out, until now, 2007 and 2008, we have been able to begin delimiting the area of exploitation of the valley and the chronological sequence that covers from the Neolithic to the present, almost uninterruptedly.

It has been prospected in 3 salt cuts, where there has been documented the presence of remains of mining tools for the extraction of metamorphic rocks (axes and slices corresponding to single-sided and cut pieces), big tools, silex outbursts and a Glycymeris bracelet fragment.

Inside the Mont of Saint Onofre, where it has been excavated and prospected, two prehistoric spaces corresponding to the final Neolithic (west of Saint Onofre) and the Chalcolithic (east of Saint Onofre) have been delimited.

It is in the eastern part of the hill where Roman *tegulae* and cooking materials were documented, so it would confirm, in the absence of room structures, the occupation and possible Roman settlement, with a chronology dating from the Ist to the Vth century AD.

In this same place, it has been documented the presence of bone remains, remains of ostreas, indeterminate prehistoric handmade ceramics, Paleo-Christian ceramics, high-medieval ceramics, medieval gray ceramics and modern and contemporary construction material.

The remains localized in the eastern part of Sant Onofre are located in a privileged and strategic place, a point that allows to dominate the Salí entrance and control the two valleys (Pla dels Fangassos and Seca-Riera Salada Valley).

The Salina Valley is an exceptional site where 6500 years of salt mining run. It represents simultaneously the only gem deposit in Western Europe accessible directly from its own surface, as well as the oldest exploitation of halite in Europe.

The exploitation in the open air (terraces exploitation system) was the system that was used from its beginning to the early 20th century, when the underground operation began (operating wells and galleries).

The production system ranges from the exploitation of common property resources 6500 years ago to a controlled operation system from the end of the Neolithic-Chalcolithic to the present. The presence of non-mining, kitchen and construction elements would confirm, in the absence of room structures, the occupation and control of the exploitation of halita by certain communities from the final Neolithic, as evidenced by the findings of the 2007 and 2008 campaigns.

Finally, we consider that the productive activity and exchange / commercialization activity was important from the Neolithic period until 1716, when with the New Plant Decree the royal salt monopoly was established. The productive and commercialization activity was reactivated from 1870 to 1991; being the highest point in the last 61 years with almost 38 million tonnes of mineral.

Ancient literary sources

Aulo Gelio: Noches áticas, A. Gaos Schmidt (ed.), Tomo I. Libros I–IV. Introducción, traducción, notas e índice onomástico. Mexico City: Universidad Nacional Autónoma de México, 2000.

Ausonius, H. G. Evelyn White (ed.), 2 vol. Loeb Classical Library, Cambridge, MA: Harvard University Press, 1919-1921.

Columella, On agriculture, E. S. Forster, E. H. Heffner (eds.), Books 5-9. Loeb Classical Library, Cambridge, MA: Harvard University Press, 1954.

Pliny. Natural History, Volume VIII: Books 28-32. Translated by W. H. S. Jones. Loeb Classical Library 418. Cambridge, MA: Harvard University Press, 1963.

Sidoine Apollinaire, *t. II et III. Lettres* (livres I-V et VI-IX), Texte établi et traduit par André Loyen. Les Belles Lettres, Paris, 1970.

References

Arnau, R. 2001. La sal com a producte de la fabricació de la potassa. In E. Barrera and A. Serena (ed.), *La sal. Cardona:* Patronat Municipal de Museus de Cardona: 79-82.

Beltrán de Heredia Bercero, J. 2001. A garum and salt fish factory in Barcino. En From Barcino to Barcinona (1st to 7th centuries) The archaeological remains of Plaça del Rei in Barcelona. Barcelona: *Museu d'Història de la Ciutat. Ajuntament de Barcelona*: 58-63.

Beltrán de Heredia Bercero, J. 2007. Cetariae bajo imperiales en la costa catalana: el caso de Barcino.

In L. Lagóstena, D. Bernal, and A. Arévalo (ed.), *Cetariae 2005. Salsas y salazones de pescado en Occidente durante la Antigüedad. Actas del Congreso Internacional Cetariae (Cádiz, 7-9 Noviembre, 2005)*: 277-284. Oxford, Archaeopress.

Blázquez, J. M. 1970. Fuentes literarias griegas y romanas referentes a las explotaciones mineras de la Hispania romana. In L. Carnicero (ed.), *VI Congreso Internacional de Minería: La Minería Hispana e Iberoamericana. Contribución a su investigación histórica. Estudios, fuentes, bibliografía*: 116-150. León: Catedra de San Isidoro.

Bloch, M. 1988. *Introducción a la Historia*. México: Fondo de Cultura Económica.

Bonnassie, P. 1979. *Catalunya mil anys enrera: Economia i societat feudal*. Barcelona: Edicions 62.

Carr, E. H. 1987. ¿Qué es la historia? Barcelona: Ariel.

Carusi, C. 2008. *Il sale nel mondo greco (Vi a.C.-III d.C.). Luoghi di produzione, circolazione commerciale, regimi di sfruttamento nel contesto del Mediterraneo antico*. Bari: Edipuglia.

Childe, V. G. 1982. *Introducción a la arqueología (4a ed.)*. Barcelona: Ariel.

Childe, V. G. 1985. *Que sucedió en la historia* (1a ed.). Barcelona: Planeta-De Agostini.

Cipolla, C. M. 1983. *Historia económica de la población mundial*. Barcelona: Crítica.

Daura, A. 2001. Troballes de restes arqueològiques romanes al Salí. In E. Barrera and A. Serena (eds.), *La sal*: 93-97. Cardona: Patronat Municipal de Museus de Cardona.

Galera, A. 2007. Sal, ganadería, cañadas, trashumancia, salazones y economía de montaña en el caso de la villa ducal de Cardona (Barcelona), la Cataluña central y los Pirineos siglos XII-XVII . In N. Morère (Ed.), *Las salinas y la sal de interior en la historia, economía, medio ambiente y sociedad*: 561-590. Madrid: Universidad Rey Juan Carlos i Dykinson.

Gaya, R. 1935. *Carta de població de Cardona, donada por Borrell II, Comte i Marquès de Barcelona, a 23 d'abril de l'any 986*. Cardona: Ajuntament de Cardona.

Harari, Y. N. 2015. *Sàpiens. Una breu història de la humanitat* (7a ed.). Barcelona: Edicions 62.

Martínez Muñoz, D. 2001. Una aproximació a la bibliografia de la Muntanya de Sal i de l'explotació minera a Cardona. In E. Barrera and A. Serena (eds.), *La sal*: 139-164. Cardona: Patronat Municipal de Museus de Cardona.

Meniz, C. 1978. *Aportación a la historia de la sal. Minas de Cardona*. Madrid: Universidad Complutense de Madrid.

Mochón, F. 2005. *Economía, teoría y política* (5a edició ed.). Madrid: McGrawHill.

Schuhmacher, T. X., and Fíguls, A. 2007. Una punta de lanza de Cardona (Bages, Barcelona). In A. Fíguls, and O. Weller (Edits.), *Prehistoric and Protohistoric Workshop. Cardona 6 de desembre del 2003*: 19-36. Cardona: Institut de recerques envers la Cultura (IREC).

Solé, X., Galera, A., Juan, M., and Aguilar, A. 1992. *Prospecció arqueològica del municipì de Cardona (Bages, Barcelona)*. Cardona: Ajuntament de Cardona (5 volums).

Where the Salt 'Kerns': Historical Archaeological Investigations at the Saltpans of the Venezuelan Islands, 17th–19th Century

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Abstract

The saltpans of the islands of the Venezuelan Caribbean were visited by numerous local and foreign seafarers to rake their plentiful salt between the 1620s and the 1880s. The historical archaeological investigations at one site on the island of La Tortuga and two sites on the island of Cayo Sal, in the Los Roques Archipelago, have opened a window onto the material lives of seafarers throughout this 256-year swath of time. This overview summarizes the excavations and the recovered material remains; preliminarily reveals the ways in which the salt from the islands was involved in large-scale political-economical processes; and underlines the potential of these archaeological sites in disclosing the often elusive everyday lives of seafarers.

Keywords: Sea salt, saltpans, seafarers, historical archaeology.

Introduction

The abundant marine and terrestrial natural resources of the dry and low-lying islands of the Venezuelan Caribbean have attracted countless foreigners since Columbus' third voyage in 1498. At the break of the sixteenth and seventeenth centuries, the Venezuelan Caribbean continued beckoning seafarers from near and distant shores, luring them no longer only with cacao, tobacco, and hides from the mainland, but also with sodium chloride from the islands—the salty mineral precipitate born from the marriage of sun and sea. Salt was in fact 'white gold' for European imperial powers since, in an age without refrigeration, it was used to preserve foodstuffs. In this way, it played a key role in extending long-distance seafaring, expanding commercial networks, and prolonging the expeditionary and military forays of empires. Salt from the Venezuelan islands was intimately entwined in the mercantilist workings of the Dutch and British empires, playing only a marginal role on the local Venezuelan scale.

In 1624 the Dutch from the Low Countries were drawn to the desolate island of La Tortuga in their quest for an alternative source of salt that they required for their lucrative herring fisheries (Figure 1). Anglo-American colonists were also enticed by the island's saltpan in the later 17th and 18th century, finding its salt free for the taking and indispensable to preserving their cod, caught on the Grand Banks off of New England's coast. One hundred and eighty kilometers to the northwest of La Tortuga, the saltpans on the long and narrow island of Cayo Sal, in the Los Roques Archipelago, drew the eyes of Dutch Antilleans and various other seafarers in the 18th century (Figure 1). In the 19th century they vied for a position amongst the most important saltpans of the Caribbean, together with those on Curaçao, Bonaire and the Turks and Caicos Islands, being harvested by merchants from the Netherlands Antilles and the recently established United States until the 1880s.

In this chapter I will present a short overview of the historical archaeological investigations undertaken at the saltpans of the islands of La Tortuga and Cayo Sal. I will briefly discuss the different seafarers who arrived at these saltpans and what we know about them from the archaeological record. Finally, I will also disclose the larger picture of the destinations of the salt that was loaded aboard ships at the Venezuelan islands, uncovering some of the ways in which it was entangled in the large-scale workings of empires and nations.

La Tortuga (1624–1638)

The Punta Salinas archaeological site (TR/S), located at the southeastern point of the island of La Tortuga and some 100km north of the Venezuela port-city of Puerto La Cruz, is approximately 5.6ha in area (ca. 200 x 280m) (Figures 1 and 2). The saltpan extend to the site's north and run more than 1km eastward towards the coast (Figure 3). Initial survey was conducted here in February 1993, shovel, test pit and systematic trench excavations were carried out in May 1993, and further trench excavations were conducted in 2009 and twice in 2010 (Antczak 2015; Antczak et al. 2015).

The human post-contact (1498+) presence at the site of Punta Salinas began in earnest during the second decade of the 17th century. The inhabitants of the

Spanish mainland provinces of Maracaibo, Venezuela, Nueva Andalucía (later Cumaná), and Margarita largely disregarded the salt-producing internal lagoons of the island of La Tortuga throughout the colonial period, having a sufficient supply of salt to the west at the saltpans of Sinamaica, Sauca, Guayguaza, and Borburata, and to the east at the great Salinas of Araya and the saltpans of Pampatar on Margarita Island (Figure 1) (María 1966: 338; Ojer 1962; Sarabia Viejo 1995). As the saltpan of La Tortuga lay unutilized by the Spanish, at the break of the 16th and 17th centuries, the Dutch began to make inroads into the Venezuelan Caribbean impelled by a pressing need for salt to preserve their vital Baltic herring fisheries. Conflict and tensions between the rebellious Dutch Republic and the Spanish Crown resulted in the 1598 ban on Dutch ships

Figure 1. Map of the Caribbean.

Figure 2. La Tortuga Island and the site of Punta Salinas at the southeastern corner.

and goods from all Iberian ports (Israel 1990: 56). As a result, the Dutch supply of salt from the Portuguese ports of Setúbal and Aveiro was cut-off, impelling Dutch seafarers beyond the Atlantic to rove the Caribbean for salt (Antunes 2008; Klooster 2003). In the following years, Dutch insistence and industriousness in the perilous and bloody business of salt harvesting would lead them on a Venezuelan saltpan-hopping quest that would claim dozens of lives and produce thousands of tons of salt.

Initially, the Dutch *zoutvaerders* (salt carriers) were enthralled by the large and productive saltpans of Araya, harvesting them since 1599 only to be repelled by the Spanish *Armada de Barlovento* in 1605. During the Twelve Years' Truce (1609–21) pressure on salt harvesting in Araya ceased, but the Dutch returned again in 1621 and 1623. They were repelled from Araya by the Spanish fort erected at the entrance to the saltpans in 1622—effectively closing them off to foreigners (Antczak et al. 2015: 191–192). The *zoutvaerders* then turned their attention to the uninhabited island of La Tortuga. Beginning in 1624, ships from West Frisia and Amsterdam loaded salt at the island. By 1632 the *zoutvaerders'* production of salt expanded to a semi-industrial scale and included pumps, channels, wooden boardwalks, a jetty, and cannon emplacements, as well as other ingenious anthropogenic modifications to the saltpan landscape (Antczak 2018: 61–62). The Dutch presence on La Tortuga was intensive and industrious, yet also bloody and short-lived. In 1630 alone, Dutch seafarers managed to cultivate and rake more than 1400 metric tons of salt at Punta Salinas (Antczak et al. 2015: 198). They persisted through three attacks by Spanish forces in 1631 and 1633, when they sustained human losses and their installations were razed to the ground. Finally, in 1638, Benito Arias Montano, the governor of the Province of Cumaná, together with 150 Spanish infantrymen and 150 allied Cumanagoto Indians, raided and destroyed a small wooden fort erected by the *zoutvaerders* and defended by 40 musketeers and eight cannons, effectively ending the chapter of Dutch harvesting of the island's salt (Antczak et al. 2015: 202–204).

In 2010, excavations of an earthwork feature (TR/S/T-1) and adjacent sandy ridge (TR/S/T-2) at the Punta Salinas site revealed what was probably the site of the 1638 Dutch fort and violent confrontation with the Spanish (Figure 4). The material evidence recovered includes various Dutch lead-glazed red earthenware cooking vessels and tablewares, Dutch and Mexican tin-glazed earthenware dishes, glass bottle fragments, lead shot, cannon balls, and other metal items, as well as 191 Dutch clay pipe fragments (Figure 5). The faunal collection, that predominantly includes rabbit bones and has very few remains of local marine resources, suggests that the musketeers—who were garrisoned at

Figure 3. Punta Salinas with the saltpan at the top (photo: José Voglar).

the site—were probably hesitant to consume local fish and mollusks and, rather, depended on more known sources of meat such as rabbits, that lived in coastal dunes on the island, and ship provisions of salted beef and pork (Antczak et al. 2015: 206–207).

The paucity of material remains from the Dutch occupation of Punta Salinas is reflective of the brief and fiercely contested timespan during which the *zoutvaerders* engaged with the island. Yet the intensive and industrious nature of Dutch salt harvesting at Punta Salinas is evidenced by the ingenious way in which the Dutch managed to modify the natural saltpan environment, maximize salt production, and resiliently weather Spanish aggression.

La Tortuga (1638–1781)

The saltpan of La Tortuga was not abandoned for very long, for in the same year that the Dutch were ousted from the island, Anglo-Americans began to venture there for salt. In 1638 the ship *Desire* returned from a

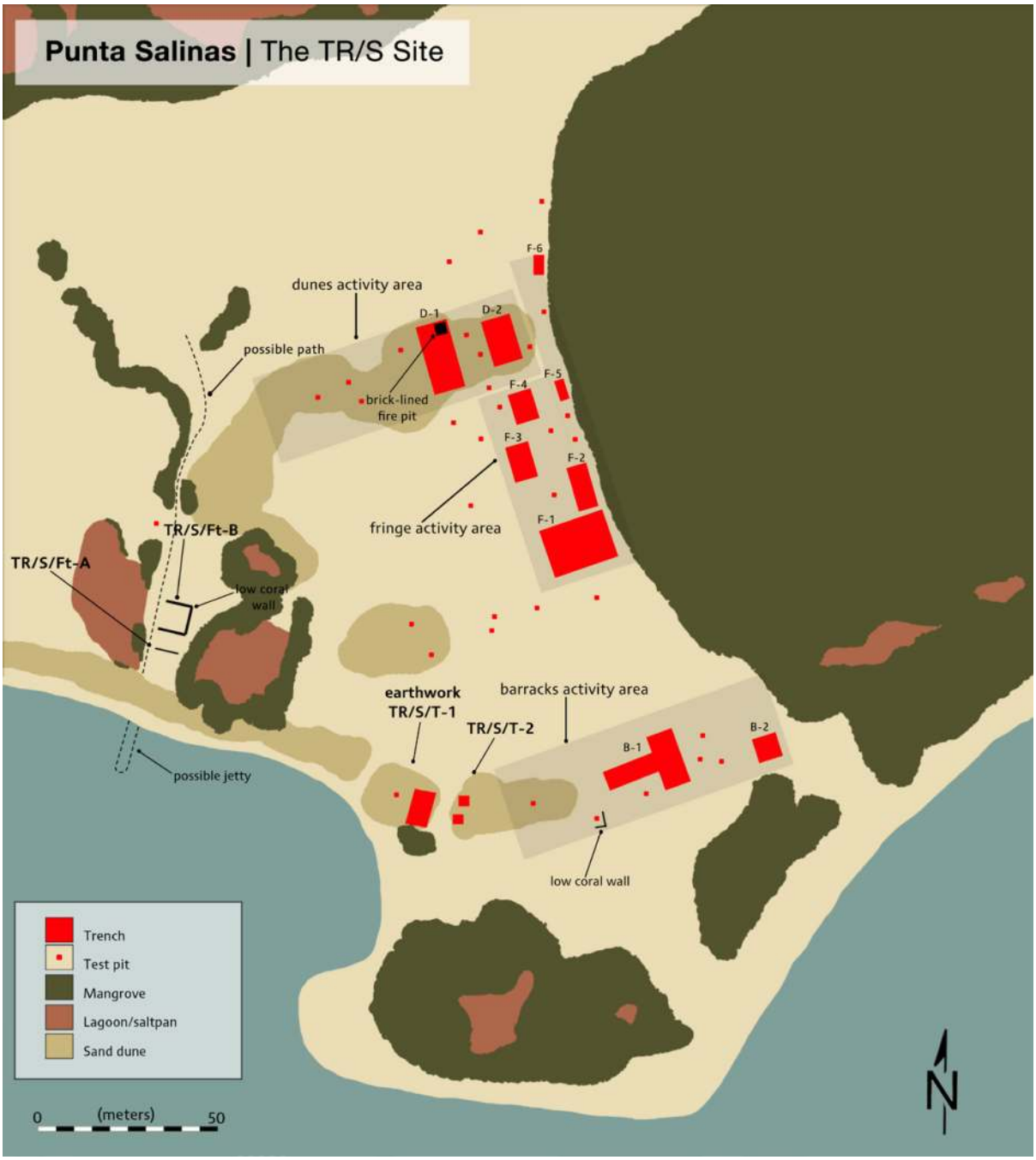

Figure 4. Map of the site of Punta Salinas (TR/S).

voyage to the West Indies and along with slaves, tobacco, and cotton, brought salt from 'Tertugos' (La Tortuga) to the small New England port-town of Salem (Newton 1934: 260). In the following decades, seafarers from Salem began to frequent Punta Salinas to load salt for the town's commercially important cod fisheries. Even though La Tortuga was a Spanish possession, Anglo-Americans assumed they were allowed to harvest salt there according to the Anglo-Spanish treaties of 1667 and 1670, and only being explicitly allowed to in the treaties of 1715 and 1750 (Headlam 1926: 244; Hertslet 1878: 82, 87).

By the early 1700s, Boston had taken over as the principal port sending merchant vessels to La Tortuga for salt, resulting in more than double the number of ships coming to Boston from La Tortuga than from Salem. Soon many other ports of the Anglo-American Atlantic world, such as New York, Philadelphia, Newport, Piscataqua (now Portsmouth, New Hampshire), New London, Connecticut, and Bermuda were involved in the harvesting of salt on La Tortuga. The author's analysis of the eighteenth-century Naval Office Shipping Lists for Boston, Salem, Piscataqua, and New York, as well as Anglo-American newspapers from the same period, shows that between 1700 and 1775 at least 939 ships loaded with salt from La Tortuga came to the aforementioned ports of the Eastern Seaboard (Antczak 2015: 162). The Venezuelan Caribbean was, nonetheless, no safe haven since, during the second half of the 17th century and especially with the appearance of the Real Compañía Guipuzcoana de Caracas in 1728, it was patrolled by Spanish *corsarios* (corsairs), who were given orders to seize any vessels engaged in illicit trade with the Spanish mainland provinces (Vivas Pineda 1998).

These *corsarios* often seized Anglo-American salt ships under pretense that they were engaging in contraband. In response to this threat, New England

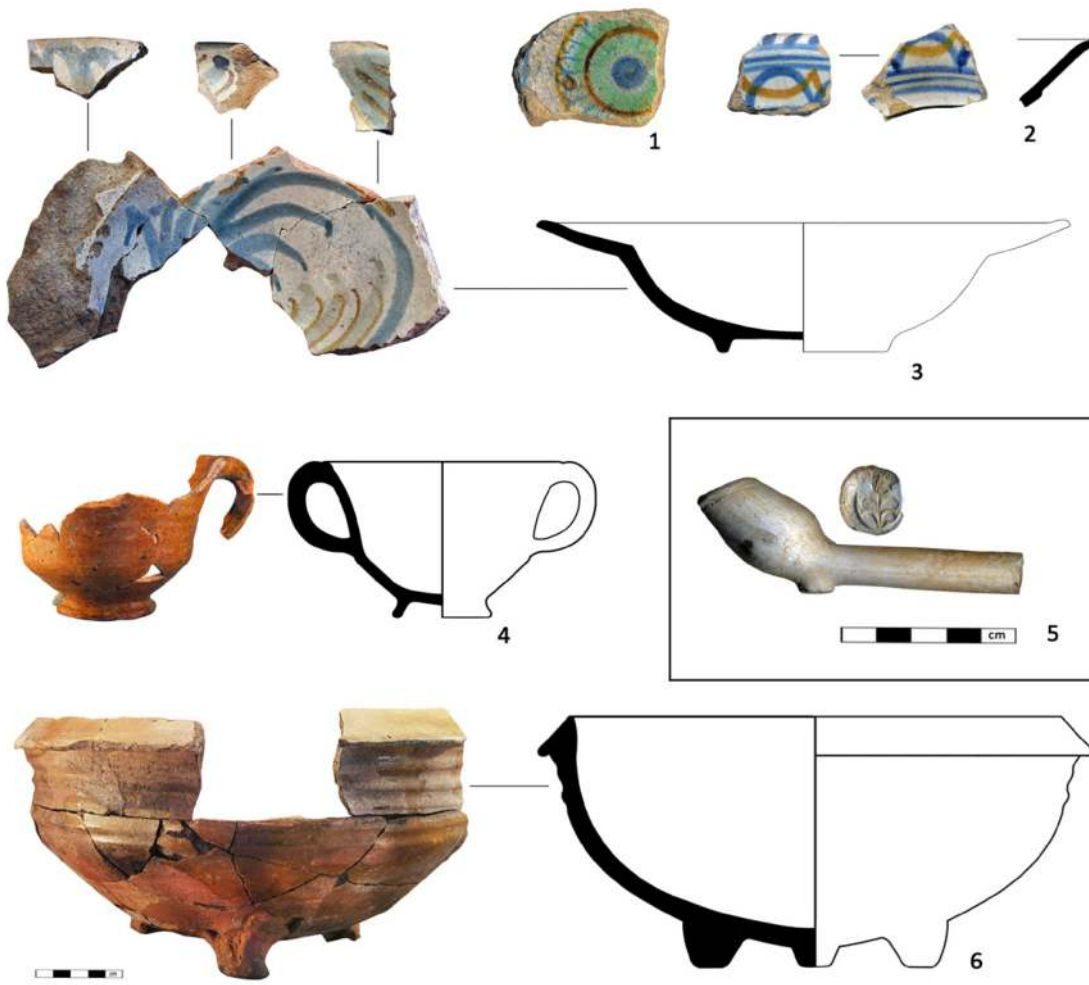

Figure 5. 17th-century artefacts recovered from the earthwork feature (TR/S/T-1). 1–2. Dutch tin-glazed earthenware dish fragments; 3. brimmed dish probably of Mexican majolica and attributed to the San Juan Polychrome style; 4. Dutch lead-glazed red earthenware two-handled porringer with a thick green glaze on the interior; 5. Gouda pipe with a tulip mark; 6. Dutch lead-glazed red earthenware tripod saucepan.

merchants organized a yearly Saltertuda Fleet that would sail to and from La Tortuga escorted by British Navy warships. From 1687 to 1768 the fleet, consisting of numerous vessels, is known to have sailed at least thirty times (Antczak 2015: 162). In 1781, the *corsario* Vicente Antonio de Icuza appeared at Punta Salinas and evicted thirty (presumably US American) salt-rakers from the island, seizing their salt in the process (Amezaga Aresti 1966: 94). The saltpan of Punta Salinas was not to be harvested by foreigners again after this incident, producing a reliable *terminus ante quem* of 1781 for the archaeological deposits there.

The merchant ships heading to La Tortuga usually left the New England coast in early December and would congregate at Barbados between December and January. Once the Saltertuda Fleet had gathered, and a British Navy ship was ready for escort, they set sail for La Tortuga in mid-January. Upon arrival at the island, the saltpan was divided up according to ship tonnage and, depending on the weather, the crews could rake salt for more than a month, often waiting for it to crystallize on the pans multiple times (Brownrigg 1748: 24–28). The dry months between February and June were perfect for the production of solar salt as pirate naturalist William Dampier (1699: 52) noted in 1682: 'the salt begins to kern, or grain in April, except it is a dry season.' Before the arrival of the rains, and once the ship holds had been loaded with salt, the fleet would set sail and pass through the Windward Passage and north of Bermuda disperse, each ship sailing to its home port (see Figure 1). In late April and early May of nearly every year, these ships arrived from La Tortuga with the salt necessary for the New England spring fisheries (Pares 1963: 631). La Tortuga salt was used to cure low-quality refuse cod which was then shipped back to the Lesser Antilles to feed the enslaved laborers on sugar plantations, providing them with a staple source of protein (Innis 1940: 76–78; Publications of the Colonial Society of Massachusetts 1927: 241).

Constrained by the La Tortuga's bleak and dry landscape, the Anglo-American seafarers-turned-salt-rakers, set up camp at Punta Salinas and interacted here with one another for up to a month at a time. Meanwhile, hanging on their bodies, buried in their pockets, and stowed within the sea chests they brought on land came their personal possessions. Many of these material things were discarded, left, or lost on the island and have been recovered through archaeological excavations. These things paint a vivid picture of the lives of ordinary merchant seafarers, their consumer practices, their senses of fashion, and their material discourses. The historical archaeological analysis of things recovered in the Dunes activity area (Figure 4), at the site of Punta Salinas, has revealed the cosmopolitan identities of seafarers, especially ship captains. When their crews raked salt on the saltpan beyond, the Anglo-American ship captains would engage in a leisurely material discourse with their peers, bringing from onboard their ships fine tablewares, exotic ingredients, and associated paraphernalia.

Drinking punch was prevalent at the site among captains and crews alike, as the 142 punch bowls from the site indicate. The Dunes activity area—overlooking the saltpan beyond—offered a prime setting for masculine sociability and material discourse. The temporality of the effects of punch as a social lubricant was capitalized on by captains. La Tortuga offered enterprising captains a unique opportunity to show off their purchasing power to their peers through personal belongings—among them fashionable English delftware punch bowls filled with exotic ingredients such as sugar, nutmeg from the East Indies, madeira wine, and seltzer water from Germany (Figure 6) (Antczak 2015).

On La Tortuga captains also put simple rum punch into circulation among their crews, helping to lessen the evident vertical distinctions between themselves and the crews toiling on the saltpan in the inclement sun and stinging salt. Alcohol, paternalistically distributed by captains to working seamen in the form of punch, was thus a key safety valve that assured that the crews would comply with the captains and do their jobs as expected. It also obfuscated the true nature of the power relations operating on the island, and limited the crews' awareness of their social situation (Antczak 2015: 183). Punch bowls and punch, therefore, became a potent metaphor of the far-reaching tentacles of the growing British mercantile capitalist world order. They became, as art historian Eric Gollannek (2008: 220) describes them, 'supercharged space[s] for the sensory consumption of empire.'

Punch, however, was not the only fancy thing brought to and consumed at Punta Salinas. Excavations at the site have revealed various teapots along with close to thirty delft and Chinese porcelain tea bowls (Antczak 2019: 275). Pouring tea from an egg-shell-thin melonware teapot into a fine porcelain tea bowl on this scorched island—where daytime temperatures often rise to above 40°C—must have involved the building of what anthropologist Pierre Bourdieu (1986: 249–251) termed 'social capital.' Other conspicuous items include a Whieldon ware coffee or chocolate pot, brass drawer pulls, escutcheons, keys, and a fine lock that might have pertained to a liquor box. Among the more than thirty shoe buckles recovered, one particularly stands out as it is an oversize and fashionable late 18th-century Artois buckle (Figure 6). The fluidity of movement of New England captains to ports in

Figure 6. 18th-century artefacts recovered from the Dunes activity area. 1. German stoneware mineral water jug; 2. melon-ware teapot from Staffordshire; 3. Wieldon ware coffee or chocolate pot; 4. English delft punch bowl probably from Liverpool; 5. copper-alloy and pewter Artois-style shoe buckle; 6. copper-alloy liquor box lock.

the circum-Atlantic was a contributing factor to the presence of the fashionable at Punta Salinas. It was through these fashionable things that the captains could underscore their cosmopolitan identities and their connections to far-flung places of the Atlantic world and beyond. These early modern seafarers were not only the movers but also the consumers of empire.

Cayo Sal (c. 1700–1800)

The long and narrow island of Cayo Sal in the Los Roques Archipelago (135km from the central coast of Venezuela) spans 16km of the southwestern boundary of the archipelago. Cayo Sal has two post-contact archaeological sites by the saltpans

located at its western end (Figures 1 and 7). The first site, Uespen de la Salina (CS/A), is located at the westernmost end of the saltpans and on the leeward (northern) coast of the cay (Figure 8). Excavations here, including shovel and test pits and two trenches, were undertaken in the decade of the 1980s (Antczak and Antczak 2006: 86–87) and more recently in 2007, and in 2009 and 2010, systematic in-trench and block excavations were performed (Figure 8). The site harbors the foundations of a coral stone structure and, on the adjacent saltpan, there can be found a series of coral dikes and walkways most probably associated with it.

The analysis of the ceramics recovered at the site suggests that it was visited from the 1720s up until the late 18th century, intermittently by Dutch Antillean salt rakers from Curaçao and Bonaire, inhabitants of the Spanish provinces of the mainland, as well as Bermudians and seafarers and privateers from the French and British Lesser Antilles (Davies 1963: 11; Jarvis 1998: 445; Klooster 1998: 101–102). The ceramic collection can be separated into five categories: 1) English creamware and delftware; 2) Spanish (Iberian) majolica and lead-glazed earthenware; 3) French faïence and lead-glazed earthenware; 4) lead-glazed 'El Morro'-type earthenware of yet-unknown provenance (Deagan 1987: 50; Smith 1962: 67–68), and; 5) a variety of coarse Afro-Amerindian earthenwares (*criollo*-wares) probably of local Venezuelan manufacture (Figure 9). Each of these categories of ceramics is well represented by a wide array of ceramic vessel forms. The site also yielded abundant zooarchaeological remains of local resources including mollusks, fishes, and marine birds as well as resources of allochthonous origin primarily consisting of cow and pig.

The documentary evidence that has been found so far for this site is still quite fragmentary, especially when compared to the abundance of records relating to La Tortuga. One Venezuelan source mentions that in 1775 eleven Dutch Antillean creoles (seven of whom were enslaved) were left on Los Roques for a week to rake salt and to fish under the supervision of an unarmed white mariner (Cromwell 2012: 257). The salt raking could have only happened on Cayo Sal, and leaving free and enslaved laborers to engage in this activity on Los Roques might have been a common Curaçaoan *modus operandi* throughout the 18th century. Moreover, the Los Roques Archipelago, with its myriad sheltered coves and secluded cays, is known to have been a favorite turtle-fishing spot for Dutch Antilleans, as well as an ideal theatre for engaging in illicit trade with the Spanish mainland. During the 17th and especially the 18th centuries, Curaçao was deeply

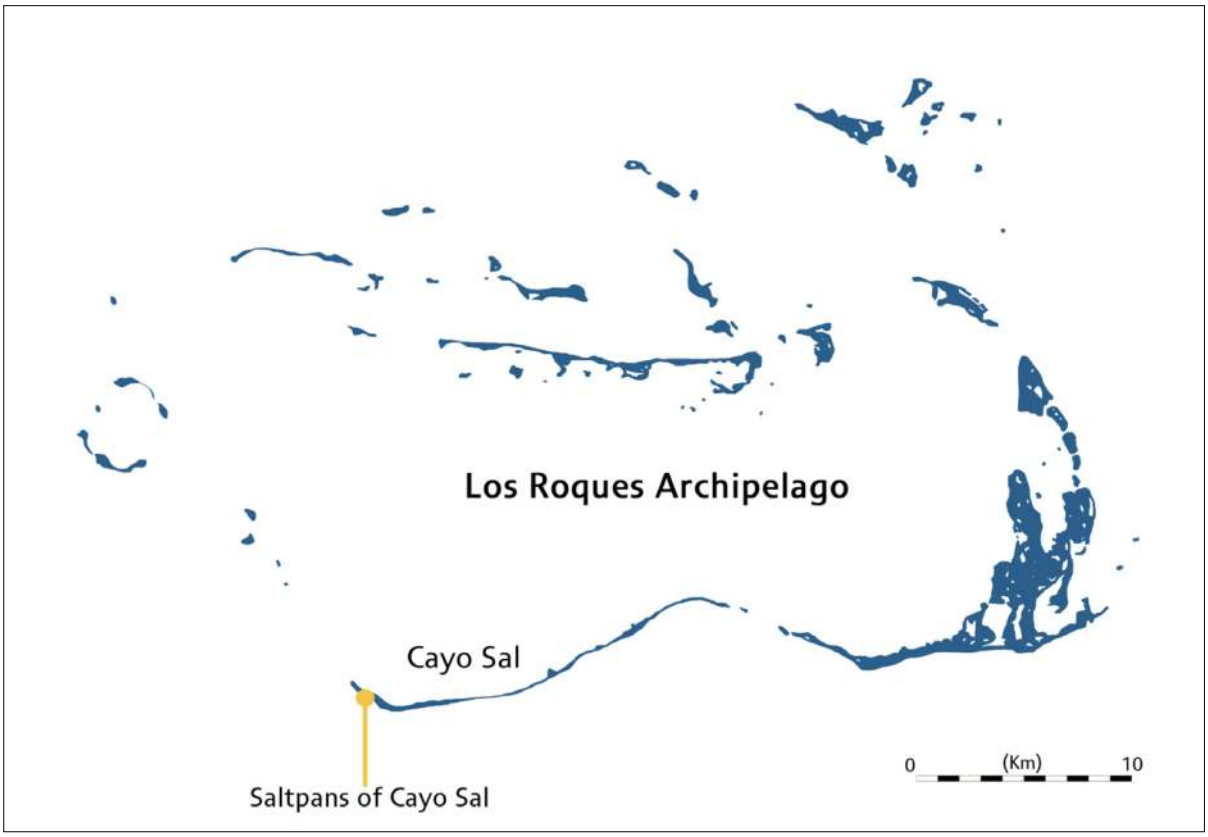

Figure 7. Map of the Los Roques Archipelago with the location of Cayo Sal and the saltpans.

Figure 8. Map of the site of Uespen de la Salina (CS/A).

involved in cacao contraband on the Venezuelan coast. Other smuggled goods included mules, hides, and tobacco (Aizpurua 1984, 1988). Dutch ships regularly sneaked into numerous sheltered and secluded bays of Venezuela's central coast to sell their goods and buy cacao from the plantations nestled in the valleys extending inland from the sea (Aizpurua 1993). In fact, Los Roques became an uninhabited and clandestine transshipment point for cacao smuggling. During rendezvous, often prearranged by letter, Venezuelan cacao growers would meet Curaçaoan traders on these islands—among which Cayo Sal was probably the most familiar—and exchange cacao beans for manufactured goods that were in short supply on the Spanish Main (Klooster 1998: 126–127).

The heterogeneous material remains at the site of Uespen de la Salina on Cayo Sal are reflective of the medley of maritime interaction and mobility in the 18th-century Southern Caribbean. Los Roques would have been an attractive site for foreign seafarers to catch turtle and fish, rake salt, and engage in lucrative informal trade with the Spanish mainland provinces. The site also displays a broader range of quality in ceramics and glass than Punta Salinas, from the more refined English delftwares and fine drinking glasses, to much more mundane mended lead-glazed earthenwares and Afro-Amerindian ceramics. Los Roques, and especially the island of Cayo Sal, would have become trans-imperial places of contact for seafarers roving the Venezuelan Caribbean.

Cayo Sal (c. 1800–1880)

Finally, the site of Los Escombros (CS/B) is located 1km east of CS/A on a sandy corridor between two large saltpans to the east and west of Cayo Sal (Figure 10). Here, the saltpans are crisscrossed by a dense network of coral stone dikes and walkways. The site and its adjacent areas harbor the remains of a partially standing coral stone and mortar house, a large salt-packing patio, and many coral stone shelters on the windward storm terraces. Excavations of shovel and test pits have been undertaken here since the 1980s and, more recently in 2005, 2010, 2012, and 2013, larger systematic excavations were performed. In 2013 the author led a community archaeology workshop at this site for schoolchildren from the local Escuela Bolivariana Archipiélago Los Roques.

During the 19th century, the site of Los Escombros was probably visited by Dutch Antillean salt rakers who had frequented the Los Roques Archipelago for decades. It is, however, uncertain who first built the coral-stone dikes and walkways on the saltpans. During the 1810s and 1820s various Venezuelan ships are known to have arrived to the port of La Guaira from Los Roques with salt from Cayo Sal.[1] US American Jeremiah Morrell was given the right to harvest the saltpans by the

[1] *Gazeta de Caracas* Mar. 3, 1814 and Mar. 7, 1814; *Gaceta de Caracas* Oct. 11, 1815 and Oct. 18, 1815; Gaceta *de Caracas* Nov. 29, 1815 and Dec. 13, 1815; *Iris de Venezuela*, Mar. 18, 1822; *Iris de Venezuela*, Jul. 15, 1822.

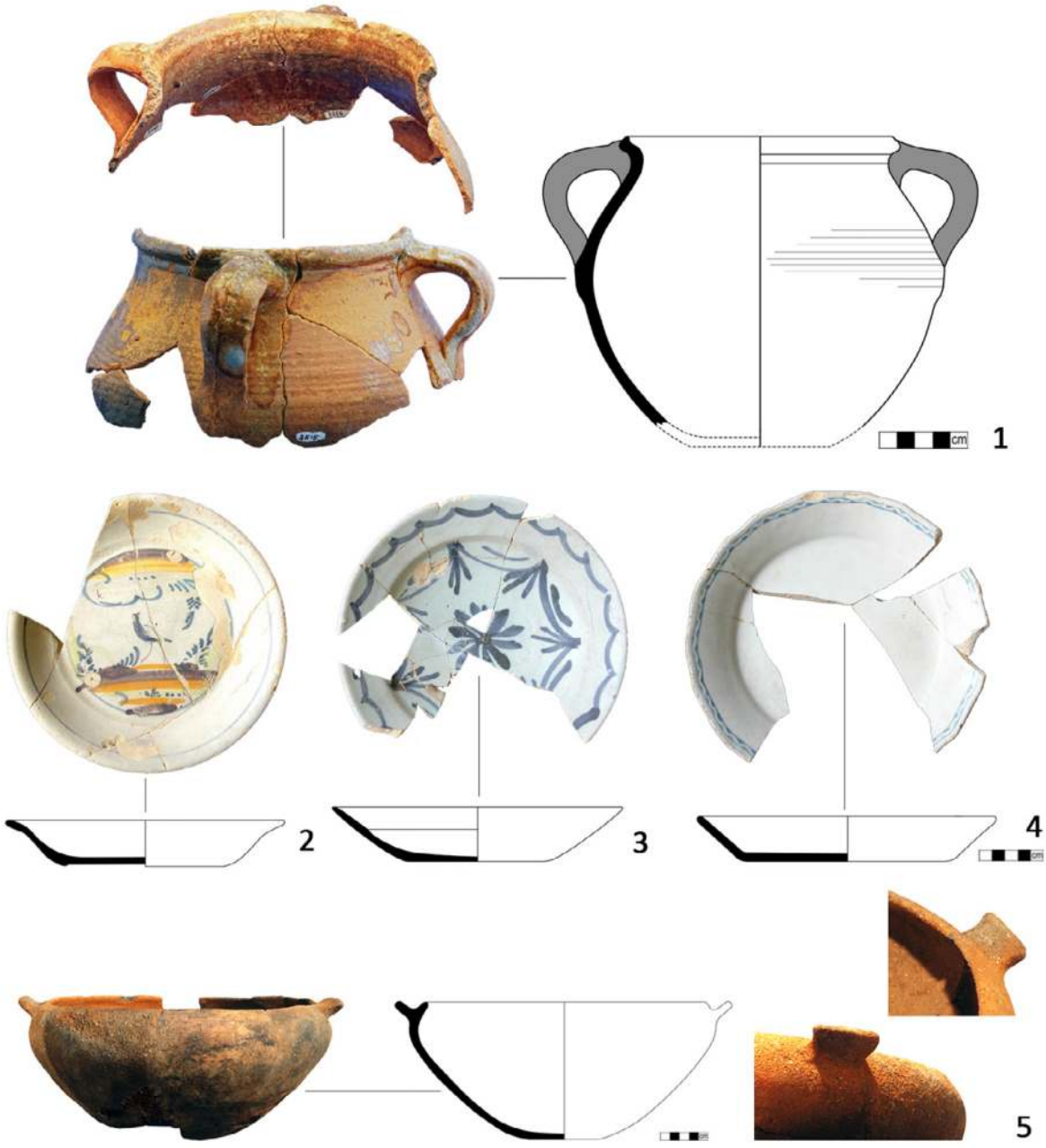

Figure 9. 18th-century artefacts recovered from the site of Uespen de la Salina. 1. 'El Morro'-type lead-glazed earthenware puchero *(cooking pot); 2. Spanish majolica plato from Triana, Seville; 3. English delft plate; 4. French Faïence blanche plate from Normandy; 5. Afro-Amerindian earthenware cooking pot.*

Venezuelan Republic between 1834 and 1842, and, at least at the beginning of the enterprise, more than 120 'free coloreds' from Bonaire and Curaçao worked on Cayo Sal (Bosch 1836: 307; Goslinga 1990: 122). It is noteworthy that during the first half of the 19th century, US Americans were the principal buyers of the sodium chloride from the saltpans of Bonaire and Curaçao, along with that from the Turks and Caicos Islands. The takeover of the Cayo Sal saltpans by Morrell angered the salt merchants of Curaçao since they were used to complementing their local salt harvests with salt brought from this island (Bosch 1836: 307). Moreover, Morrell sold his Cayo Sal salt at a lower price than the Dutch Antilleans, curtailing the Cura**ç**aoan salt's competitive strength for a few years (Goslinga 1990: 122–123).

The archaeological materials recovered from the site of Los Escombros are abundant. The ceramic wares mostly date to between 1830 and 1840, falling within the years

Figure 10. Map of the site of Los Escombros (CS/B).

Figure 11. 19th-century artefacts recovered from the site of Los Escombros. 1. industrial slip whiteware bowl; 2. hand-painted whiteware teacup; 3. hand-painted whiteware saucer; 4. Afro-Amerindian red-slipped and incised earthenware cooking pot; 5. copper-alloy thimble; 6. Probably a gaming piece made from a shell-edged whiteware sherd; 7. clay pipe.

of Morrell's tenure of the saltpans. The ceramics mainly consist of hand-painted British whiteware and industrial slipwares from Staffordshire, but also include English delft apothecary jars, flow blue and yellowware plates, and French Vallauris coarse earthenware cooking pots (Figure 11). A large number of both plain and decorated Afro-Amerindian ceramics have also been found at the site. The archaeological materials also include various forms of glassware and glass containers, metal objects including a thimble, clay pipes, and objects in bone and stone (Figure 11). The zooarchaeological remains are varied and include both local marine fauna and seabirds, as well as allochthonous species such as pig and cow.

Concluding remarks

In conclusion, the temporary salt raker campsites excavated on the islands of the Venezuelan Caribbean offer a 256-year-long view of the lives of seafarers at the uninhabited mid-points on their maritime itineraries. This research seeks to broaden scholarly understandings of seafaring lives from the 17th to the 19th century by complementing and contextualizing the work of historians studying seafaring life and that of archaeologists delving into the material aspects of life at sea through excavations of shipwrecks, the homes of ship captains, and port taverns of the period.

The investigations reveal that the Venezuelan Caribbean and its insular saltpans were entangled in a web of local, regional, and trans-Atlantic dependences. Even though the salt harvested on the Venezuelan islands was important to imperial and national political-economies, the historical archaeological investigations at the saltpans tell stories of a more life-sized scale. Not only were 'anonymous' seafarers the backbone of colonial economies and essential to the rise of modern empires, they were also avid everyday consumers of the fruits of those very empires. Seafarers were increasingly entrapped in a new and growing world of interrelations with material things, brought about by the expansion of global capitalism and by the dawn of industrialization. While large-scale phenomena and their global effects have been extensively studied in history and archaeology, the manner in which they came about through everyday life, involving the engagement of seafarers with concrete things, is being understood in a new light from the saltpans of the Venezuelan Caribbean.

Acknowledgements

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References

Aizpurua, R. 1984. El contrabando en la Provincia de Venezuela en tiempos de la Compañía Guipuzcoana 1730–1784. *Revista/Review Interamericana* 1, 4: 4–19.

Aizpurua, R. 1988. Las mulas venezolanas y el Caribe Oriental del siglo XVIII: datos para una historia olvidada. *Boletín Americanista* 38: 5–15.

Aizpurua, R. 1993. *Curazao y la Costa de Caracas: Introducción al Estudio del Contrabando de la Provincia de Venezuela en Tiempos de la Compañía Guipuzcoana, 1730-1780*. Caracas, Academia Nacional de Historia.

Amezaga Aresti, V. 1966. *Vicente Antonio de Icuza Comandante de Corsarios*. Caracas, Italgráfica.

Antczak, K. A. 2015. 'Tavern' by the saltpan: New England seafarers and the politics of punch on La Tortuga Island, Venezuela, 1682–1781. *International Journal of Historical Archaeology* 19, 1: 159–187.

Antczak, K. A. 2018. Cultivating Salt: Socio-Natural Assemblages on the Saltpans of the Venezuelan Islands, Seventeenth to Nineteenth Century. *Environmental Archaeology* 23, 1: 56–68.

Antczak, K. A. 2019. *Islands of Salt: Historical Archaeology of Seafarers and Things in the Venezuelan Caribbean 1624–1880.* Leiden, Sidestone Press.

Antczak, A. and Antczak, M. M. 2006. *Los Ídolos de las Islas Prometidas: Arqueología Prehispánica del Archipiélago de Los* Roques. Caracas, Editorial Equinoccio.

Antczak, A., Antczak, K. A., and Antczak, M. M. 2015. Risky business: historical archaeology of the Dutch salt enterprise on La Tortuga Island, Venezuela (1624–38). *Post-Medieval Archaeology* 49, 2: 189–219.

Antunes, C. 2008. The Commercial Relationship between Amsterdam and the Portuguese Salt-Exporting Ports: Aveiro and Setúbal, 1580-1715. *Journal of Early Modern History* 12, 1: 25–53.

Bosch, G. B. 1836. *Reizen in Westi-Indie en door een Gedeelte van Zuid-en Noord-Amerika*. Utrecht.

Bourdieu, P. 1986. The forms of social capital. In J. E. Richardson (ed.), *Handbook* of *Theory and Research for the Sociology of Education*: 241–58. Westport, Greenwood Press.

Brownrigg, W. 1748. *The Art of Making Common Salt*. London.

Cromwell, J. L. 2012. *Covert Commerce: A Social History of Contraband Trade in Venezuela, 1701-1789*. Unpublished PhD thesis, University of Texas at Austin.

Dampier, W. 1699. *A New Voyage Round the World, Volume I*. 4th edition. London, James Knapton.

Davies, K. G. (ed.). 1963. *Calendar of State Papers Colonial, America and West Indies, Volume 43, 1737*. London, H.M. Stationery Office.

Deagan, K. A. 1987. *Artifacts of the Spanish Colonies of Florida and the Caribbean, 1500-1800. Volume 1: Ceramics, Glassware, and Beads*. Washington DC, Smithsonian Institution Press.

Gollannek, E. F. 2008. *'Empire Follows Art': Exchange and the Sensory Worlds of Empire in Britain and its Colonies,*

1740–1775. Unpublished PhD thesis, University of Delaware.

Goslinga, C. Ch. 1990. *The Dutch in the Caribbean and in Surinam 1791/5–1942.* Assen/Maastricht, Van Gorcum.

Headlam, C. (ed.) 1926. *Calendar of State Papers, America and West Indies, Volume 27, 1712–1714.* London, His Majesty's Stationery Office.

Hertslet, E. 1878. *Treaties and Tariffs Regulating the Trade Between Great Britain and Foreign Nations; and Extracts of Treaties Between Foreign Powers, Containing Most-Favoured-Nation Clauses Applicable to Great Britain, in Force on the 1st August, 1878, Part V*. London, Spain, Harrison and Sons.

Innis, H. A. 1940. *The Cod Fisheries: the History of an International Economy.* New Haven, Yale University Press.

Israel, J. I. 1990. *Dutch Primacy in World Trade 1585–1740*. Oxford, Clarendon Press.

Jarvis, M. 1998. *'In the Eye of All Trade': Maritime Revolution and the Transformation of Bermudian Society*. Unpublished PhD thesis, College of William & Mary.

Klooster, W. 1998. *Illicit Riches: Dutch Trade in the Caribbean, 1648–1795*. Leiden, KITLV Press.

Klooster, W. 2003. An Overview of Dutch Trade with the Americas, 1600–1800. In J. Postma and V. Enthoven (eds.), *Riches from Atlantic Commerce: Dutch Transatlantic Trade and Shipping, 1585–1817*: 365–83. Leiden, Brill.

María, Hno. N. 1966. *Historia de la Conquista y Fundación de Caracas.* Caracas, Ediciones del Cuatricentenario de Caracas.

Newton, A. P. 1934. *The Colonising Activities of the English Puritans: The Last Phase of the Elizabethan Struggle with Spain*. New Haven Yale University Press.

Ojer, P. 1962. *Las Salinas del Oriente Venezolano en el Siglo XVII*. Caracas, Universidad Católica Andrés Bello.

Pares, R. 1963. *War and Trade in the West Indies, 1739–1763*. London, Taylor and Francis.

Publications of the Colonial Society of Massachusetts. 1927. *Transactions, Volume 26*. Boston, Colonial Society of Massachusetts.

Sarabia Viejo, M. J. 1995. Evolución del estanco de la sal en Venezuela. In M. del Carmen Mena García, M. A. Eugenio Martínez and M. J. Sarabia Viejo (eds.), *Venezuela en el Siglo de las Luces*: 83–100. Sevilla, Muñoz Moya y Montraveta.

Smith, H. G. 1962. Archaeological Excavations at El Morro, San Juan, Puerto Rico. *Florida State University Notes in Anthropology* 6.

Vivas Pineda, G. 1998. *La Aventura Naval de la Compañía Guipuzcoana de Caracas.* Caracas Fundación Polar.

History

Salt Outlets: Which Statistical Profiles in the Roman Empire?

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Abstract

This contribution is aimed at determining to what extent statistical profiles could be elaborated with regard to salt outlets in the Roman Empire (even if Rome's rise to dominate over the Mediterranean took place during the Republican period). It is merely considered as a geographical area.[1] The scholarly consensus of the total population of the Roman Empire centers around 60 million people. What would be the corresponding salt consumption? The yearly figure for which we are indebted to Cato the Elder[2] relates to domestic uses (too much for dietary intake, and less than appropriate to meet global requirements). As a foodstuff salt is used either in cooking or in food processing (fish salting, meat curing). The human priority for a continuous supply of food, clothing and housing largely depends on livestock. Besides dairy products, skins and leather include methods like dehydration via salt which improve their preservation and utilization. A number of goods destined for the Roman army, especially tents, require huge quantities of leather and hides for its equipment.

It makes sense to investigate which data are available in literature and archeology to be used to elaborate statistical profiles. Such profiles are artifacts indeed. It is nevertheless easy to understand that they would obviate current lack of figures. The growing application of quantitative analysis in salt production and uses makes it essential to define a clear-cut methodology, its limitations and appropriate interpretation to compensate the absence of reliable statistics pertaining to its ancient economy. The pertinence of these post hoc constructions depends on the combination of available parameters (including demography).

I suggest changing this sentence to : We must develop an ability to make the correct evaluation of what the salt market was, with respect to its dietary uses, salsamenta processing, livestock activities, etc. Next to the meat itself, hides and skins are a significant source of income. As soon as the animal is killed, the hide is subject to decomposition by bacterial action. This decomposition is stopped by curing it with dry salt or concentrated brine. With either method, the actual salt needs approximate 30%, even slightly less of green hide mass. The example of the tents necessary for the Army allows their calculation within this sector. 126 kg of salt are used for a standard tent (1.8 kg per hide x 70). The theoretical requirements of the Army represent at least 22.000 tents. The total of salt for that purpose relates to 2 800 t. By taking into account the requirements of the auxiliary troupes, although less important, the volume can be raised to 4 600 t. Similar calculation applied to other leather goods would contribute to a more accurate appreciation of what the global market might be.

Other outlets deserve similar elucidation and criticism. The difficulty remains to collect a good deal of information. Every trial paves the way to a better evaluation of salt economy, more especially with the view to check whether the offer meets the requirements of the demand.

Keywords: Salt, diet, fish salting, meat curing, hides and skin, tents, population, legion, profiles, statistics.

Introduction

Let us say a few words about methodology. After setting out the main object of the debate, we should like to weigh the merits of salt profiling by focusing on a number of features associated with salt consumption in relation to Roman population size. The present contribution would conclude with a look at comparative attempts in that way. We hope to clarify the terms of the debate by establishing the potential of specific variables which contribute to evaluating the magnitude of salt outlets within the Roman population framework. Which statistical data are available in ancient literature as regards to salt? A few are reliable from a small number of authors, especially Aristotle and Cato the Elder. Some others derive from extemporal uses. Ham salting requires the same quantity of salt over centuries. Cato mentions half a modius, which is not so different from current practices. Varro claims (*RR* II, 4, 11) that the Insubrians in Northern Italy salted down three to four thousand sides. A similar remark is valid for physiological requirements of this essential substance in relation to animal feeding (stock breeding). Inadequate salt intake can decrease feed and water intake, milk production, and growth of lambs. Most animals, including sheep, have a definite appetite for salt so that minerals containing salt, particularly loose salt, are usually consumed to a greater extent than salt-free minerals today. Mature sheep will consume 9 g of salt daily, and lambs half this amount. The ration reported by Aristotle for sheep is one *medimnus* (4.62 *modii*). What they currently are seems in line with what

[1] The Roman Empire extended from Scotland in the north to Numidia in the south, from the Straits of Gibraltar to Iraq in the east.
[2] 1 modius per capita (7,3 kg).

they have been in Antiquity. Concerning man, a vital minimum is assumed to be around 2-3 g/day. Research explains that low sodium could be unhealthy. This amount corresponds to a threshold which does not reflect effective dietary salt intake, known to vary widely according to seasons and life standards. Accurately performed 24-hour urine collections are presumed to be valid for estimating salt intake in individuals. There are difficulties in estimating correctly salt intake even with repetitive measurements. It is generally admitted to average 7 to 12 g/day per capita. Grandazzi assumes that 'in Antiquity the annual consumption of salt per capita can be fixed at a minimum of twenty kilograms'. This amount meets the ration indicated by Cato the Elder, one modius, equivalent to 7.3 kg per annum or about 20 g/d. Therefore, whenever reading literary material, if any reference to salt comes up, keep it in a file.

In the middle of the world

In Roman Italy, there is a continuous decline of free peasantry. Large landowners directly exploiting the soil were able to play the market to their own advantage and forced the landless of the countryside into the rank of the dispossessed men doomed to a miserable existence in Rome. In the same time, Roman merchants supplanted Carthage and pioneered trade in the Far West (Atlantic). The character of Trimalcion parodies the Julio-Claudian adventurers. On one trip alone, he earned 500 000 *denarii* trading wine, bacon, salsamenta, perfume and slaves. As many as 120 vessels sailed from Myos Hornos to India (Strabo, *Geo.* II, 5, 12). Hydraulic technology contributed to increase productivity in agriculture and mining. This development presupposed a large amount of capital. A certain degree of integration began under the last century of the republic and continued under the empire thanks to *pax romana*, which lasted until the death of Marcus Aurelius in AD 180. Over 100 million sesterces must have been invested in ships to feed people living in Rome. This amount represented only <1 % of the capital owned by Roman senators.

The Senate equated the product of land (grain, wine, salt, flax, linen, wool and livestock) with wealth and held that the State's business was to create the environment for efficient production of goods, which in turn would benefit its members. Irrespective of its member's political weakness, the empire relied chiefly on the Senate to run it. Tax collection and defense needs, which remained the overriding obsession of the Roman Empire, explain why the provinces had the best road system.

The concomitant growth in bureaucracies directly responsible to the Emperor threatened to enlarge the gap between the creation of wealth and the confiscation of revenues. Intercommunication had been established throughout the world by the authorities of the Roman Empire. Life had been facilitated by the exchange of commodities, and by the partnership in the blessings of peace. Even things that had lain concealed had all now been established in general use (Pliny, *NH*, XIV, 3). The denarius became the standard for a common monetary system. The Edict on maximum prices (301) testified to both the existence of a market economy and the operation of supply and demand mechanisms.

The largest industry in ancient Rome was mining, which provided the stones for the enormous building projects and metals for tools and the weapons that conquered the western world. Greece and northern Italy provided marble for the buildings that awed the ancients and modern people alike. Large quantities of gold and silver were mined in Spain to mint coins and create jewelry, while mines in Britain produced iron, lead and tin for weapons and pots. Cities and towns throughout the empire established small-scale manufacturing plants that turned out hand-made pottery, glassware, weapons, tools, jewelry and textiles.

In institutions, an opportunity to find elements that could contribute to a quantitative evaluation of salt needs seems achievable. To what extent do ancient Roman institutions facilitate research regarding economic resources? It depends on their relationship to the market. Adequate choice of selected institutions is driven by immediate interest and conditioned by the regulations and registries related to the market (demand and supply). Scholars continue to argue about the place of trade in classical Antiquity and its development within a Mediterranean-wide economic system. In considering the ways and means by which societies meet their basic requirements, they try to determine the interaction between the dynamics of population, including food crops and mineral resources, shaped by the particular conditions of the ecosystem. Vital factors such as the size of the populations, their nutritional status, their life expectancy, and migrations have direct consequences for military capability, the acquisition of resources from outside regions, the production of the necessary equipment, and the export of surpluses, preferably with added value. Urbanization encouraged the development of trade because it increased demand in a market where not only surpluses but also specialized products for a more sophisticated demand, like salsamenta and garum, were attractive for the consumer emerging as such.

Jugs

A look at the Roman wine trade illustrates the importance of the empire-wide exchanges in agricultural commodities. Several decades of amphora studies provide ample evidence that such products

were traded on a massive scale throughout the Mediterranean and beyond. The acidity of certain wines was regulated by adding gypsum or salt to stabilize its fermentation and improve its quality. The Roman commitment to public infrastructures and hydraulic engineering boosted agriculture through a remarkable mastery of water, including salt gardening (advances in water lifting technology), i.e. numerous maritime fishponds and salt pans.

Fish spoils easily. Its preservation by salting allows fish to be consumed outside the fishing season. Garum and other fish sauces represent specialties extensively appreciated in the Roman diet. Altogether, there are different types of salted fish products that were generally inexpensive. The archaeological evidence for large scale salt fish and fish-sauce production is not restricted to the Western Mediterranean. Pontic establishments and their salting vats have been recognized since the 1930s. Moreover, fish was not the only product being preserved in salting factories. With regard to large commercial salting facilities, various volumes of fish or meat and varying salt concentrations were processed in concrete vats (*cetariae*). It would have been helpful for evaluating the corresponding quantities of them both to collect other information than a mere percentage (salt to fish).

Salt was available for *salsamenta* of all types. Food processing and preservation (fish salting and meat curing) played an increasingly important role as soon as foodstuffs were traded over long distances. The preservation of fish by salting or smoking and the production of fish sauce (garum) is well attested by literary sources and the wide range of sites along the coasts of the Mediterranean basin and Black Sea where fish salting vats have been found. One major aspect of fish salting is the amount of salt required for its processing. Vinokurov suggested the annual amount of salt needed at Zolotoe was exceeding 125 tons/year. Wasowicz considered that salting fish in the 16 vats of Tyritake required around 120 tons of salt. Kadeev has calculated that >800 tons were needed in Chersonesos for a non-specified number of vats. As a comparison, the amount of salt to be used in Lixus (Mauretania Tingitana) presumably amounted to 250 tons, according to Hesnard. Other processed animal products such as ham (and other pork sides), sausage and cheese were traded on a significant scale. The pig produces neither wool (cloth) nor milk (cheese) but is fairly productive in meat (at least eight per furrow). Pork meat and by-products meet basic dietary requirements thanks to salting. Cato the Elder described how to proceed. Salt is lain down in the bottom of a large jar. Pork sides are placed skin down on the salt layer and covered with another one. Several layers are alternatively introduced into the jar (*Agricultura*, 162). Columella gives similar methods for preserving hams (*Res rusticae*, XII, 55). Except for them, half a modius, the amount of salt used is fairly variable. How much? A tasty production requires a light hand with the salt.

Available evidence remains inconclusive because the interpretation of any individual example depends on prior assumptions about what has been selected for a pro domo demonstration, not totally free from the application of modern economic concepts and definitions. Fish salting or meat curing provides an incomplete profile at the production level because most of the selection criteria are missing, especially the market size (consumers' choice and number).

Population

It is somewhat impossible to arrive at anything like reasonably accurate estimates of population figures at any time in Antiquity. Therefore, plausible approximations would be invaluable for our understanding demographic and economic conditions at various periods in earlier or later Antiquity. Broad statements about expansion, decline or migration of populations at different times or different places can be inferred from archaeological evidence by the distribution, size or abandonment of sites, pottery distribution, quantity and types of artifacts. Much more sophisticated, recent demographic estimates based on ethno-archaeology, extensive surface surveys, and settlement pattern studies yield more qualitative information. The recent advances in archaeology, especially in the analysis of the forms and shapes of pottery, the investigation of shipwrecks, and the huge quantities of material that have been collected and classified have not settled the debate about production and trade in terms of fluxes concerning food supply and high value-added goods.

Ignorance of ancient population numbers is due to a lack numbers sufficiently accurate to be reliable. Our estimates of the approximate order of magnitude remain a matter of guesses regarding the demography of the less disputable period, i.e. the Roman Empire. Assessing the size of the Roman population in the imperial period is still contentious. The estimates that have emerged are fairly variable. A paper by Walter Scheidel provides a critical assessment of the current state of the debate about the size of the population of Roman Italy.

In the field of urban demography, much attention has been paid to the dynamics of general growth, while a good deal less has been devoted to factors affecting a number of cities. As far as Rome is concerned, an acceptable picture of the overall trends emerges although wide variations are observed in estimates for various periods of its history.

AD 14 1 015 600 inhabitants
AD 130 1 128 750 inhabitants
AD 320 785 000 inhabitants

A tremendous demographic fall took place in 408-409 when the population was supposed to have declined by some 300 000 inhabitants. Until the sack of Rome (AD 410), its population numbered roughly 800 000 inhabitants. Rome's total population fell to 500 000 by 419. Figures for the annona suggest that the inhabitants of Rome numbered between half and three quarters of a million in the early fourth century. Constantinople reached the same figure in the sixth century, while Alexandria was half this size.

This is an appropriate time to reassess the evidence because of the flood of new writings on the subject. One of the stimulating arguments is that the classical family is not in our sense a family at all and might have different internal dynamics with specific demographic consequences. 'The population of the Roman Italy' as studied recently by Saskia Hin, is a twofold book. It appears to be an attempt to redefine the long standing debate between the supporters of high and low estimates for population size and growth. It also draws attention to a re-examination of Roman demography aimed at refreshing the ongoing dispute over the interpretation of the census figures. Remember that, in 1994, Elio Lo Cascio raised the feasibility of an Italian gross population of 14 to 16 million inhabitants under Augustus, and more precisely 16.4 million in AD 14. Ten years later, he preferred to lower his previous estimates. Such data were admitted to be barely compatible with the carrying capacity, agricultural environment and the extent of arable land in the Italian peninsula. New arguments had emerged that the free Italian population was not expanding as widely as claimed but was growing only slightly over the two last centuries of the Republic. Hin argues that the Roman citizen population amounted to 4.95 million inhabitants in 225 BC and rose to 6.7 million (8.2 including slaves) in 28 BC. She provides a better understanding of Roman demography by focusing on mortality, fertility and migration, three factors which need to be adapted to changing climatic, economic and social conditions.

As a matter of fact, the debate is about much more than mere numbers. It concerns the dynamics of Italy's population, such as the widespread extinction of small farms and their replacement by large estates, volunteering of broken men to be recruited for legionary service, changes in access to public land (*ager publicus*), and climate impact on agricultural production. Quantification is essential as soon as we are able to judge the combined effects of these factors in terms of economic opportunities. The availability of natural resources changes over time. Climatic evolution has a role with regard to cultivable land. Temperature is one among many variables involved in harvesting the sea. A population total of 18 million inhabitants had long been considered very high compared with what was known of Italian population. By the end of the Augustan period, 21 million has been suggested. Slaves would have represented nearly 30% of this total. It is no longer possible to state that the servile part of the Italian population ever reached 2 or 3 million men out of a total population of 7.5 million in the age of Augustus. Although Italy would have housed a large concentration of slaves, a range from 1 to 1.5 million seems to be a plausible estimate.

When moving to the entire Empire, estimates vary between 45 and 80 million. There are indeed many estimates of the population of the Roman Empire. Beloch's evaluation did not exceed 54 million inhabitants during the reign of Augustus. This number is presumably as high as 80 million. Later on, the population of the Empire would have approached 130 million. Anyway, the question that arises immediately is the size of the Roman economy, i.e. the subsistence volume capable to support that population. There was at least one organization capable of generating significant demand, namely the Roman army. The Roman army offers good opportunities to evaluate quantities of salt needed for the diet or for the production of equipment like tents.

Military diet

Comprised of about 5 500 men each, there were 25 legions in the field under Augustus.[1] The total was thus 140 000, to which 150 000 should be added for auxiliary troops. Imperial forces helped in integrating the local economies while the Caesar involved himself in maintaining infrastructures.

Numbering was concerned almost entirely with what came under State control in connection with the annona. By the third century the supply of food to the military (*annona militaris*) had become a regular tax. Salt has never been covered by the annona. It seems difficult to set an exact quantification for dietary salt requirements of legions and auxiliary troops. Although the Ancients did not have a scientific understanding of the body's needs for salt, the ration meeting these requirements was large enough, beyond physiological ones by reference to Cato the Elder, who attributes one modius per head for people working in his estates.

There are a handful of scattered references to the amount of food issued to Roman soldiers, the best studied ones being Polybius's figures for the grain ration. For salt,

[1] Africa Proconsularis 1, Dalmatia 2, Egypt 2, Germania 8, Moesia 2, Pannonia 3, Spain 3, Syria 4.

they are rather scarce. Each Roman soldier received a salt ration in early Republican times in the form of money to buy it later, which he used to preserve meat and fish. It is commonly believed that Roman soldiers were at certain times paid with salt. This, however, is a misconception: 'salary' derives from the Latin word *salarium*, meaning money given to soldiers 'so they could buy salt'. This has not to be taken for granted due to a patent lack of evidence. Regardless, the legionary seems to have been reluctant to eat unsalted food, particularly when stationed in unsecured areas where salt restriction was felt to weaken fighting capability. Salt was thus a very important part of the soldier's diet. Vegetius includes salt with grain and *posca* as one of the absolute necessities for provisioning the army (*Epit*. 3, 3). Appian lists salt among the basic provisions. Lucullus's army lacked at war in Spain in 153 BC. The soldiers complained of bad quality food with a high risk of intestinal disease. Another illustration of this sensitivity is observed when the Salassi, who used to import their salt needs, were forced to surrender due to the interruption of their supply (App. *Illi*. 4, 17). The legionaries had a variety of food depending on whether they were at war or at a fort. In any case, salt was indispensable.

When Roth provided the reconstruction of the Roman daily military ration, he diverged from certain predecessors and proposed 40 g/day whereas 21 g/day (Stolle) appeared to be fairly enough. Davies argued that the diet of a Roman soldier in a peacetime garrison would have resembled that of the local population because, generally, the surroundings provided most of the legionary food. Much of Davies' work in 'The Roman Military Diet' is interpretation, but some of it is based on the scientific analysis of bones excavated from Roman British and German military sites dating from Augustus to the third century. Broken beef bones suggest the extraction of marrow for soup. Alongside the animal bones, archaeologists found equipment for roasting and boiling the meat as well as for making cheese from the milk of domesticated animals. Fish and poultry were also popular, the latter especially for sick individuals.

Tents and other equipment

The skins rapidly putrefied and became useless, so a method of preservation was needed. The earliest method was to stretch the hides and skins on the ground to dry, rubbing them with fats and animals brains while they dried. This had a limited preserving and softening action. Primitive man discovered also that the smoke of wood fires could preserve hides and skins, as did treating them with an infusion of tannin-containing barks, leaves, twigs and fruits of certain trees and plants. It seems likely that humans first discovered how to make leather when they found that animal skins left lying on a wet forest floor became tanned naturally by chemicals released by decaying leaves and vegetation. Much later, the use of salt or alum as a tanning agent to produce soft leather was discovered. The alum leathers could be dyed with naturally occurring dyestuffs in various plants.

Preparing hides begins by curing them with salt. It removes the excess of water from the skin and reduces their moisture content. In wet salting, the hides are heavily salted then pressed into packs for about three weeks. In brine curing, the hides are agitated in a saline bath for about fourteen days. Salt use prevents the skin from unfavorable bacterial growth and brings them to a proper condition for satisfactory tanning. Tanning involves first curing the hide with salt, then adding a chemical substance to preserve it, and lastly to finish it.

Let's develop the following scheme:

Leather and skin curing
- Among various outlets, tents
    - What amount of salt per hide?
    - How many skin panels per tent?

A major consumer, the Army
- Legions and auxiliary troops
    - How many men?
    - How many per tent?
    - Theoretical salt needs concerning tents

The earliest crude leathers were made by first immersing the raw hides and skins in a fermenting solution of organic matter in which bacteria grew and attacked them, resulting in a loosening of the hair or wool and some dissolving out skin protein. They were then scraped off with blunt stone or wooden scrapers, and fat or meat still adhering to the flesh side was removed in a similar manner. Tanning, the conversion of pelt into leather, was done by dusting the raw stock with ground up bark or other organic matter and placing them in shallow pits or vats of tannin solution. Further additions of ground bark were made from time to time until the tannin solution had penetrated through the skin structure, taking up to two years for very thick hides. The leather was then hung up for several days in open sheds. The dressing of the leather involved paring or shaving it to a level thickness, coloring, treatment with oils and greases, drying and final treatment of the grain surface with waxes, proteins such as blood and egg albumins, and shellac to produce attractive surface finishes.

We ignore the military standards regarding the selection of hides for tent making, instead referring to a comparative table showing namely the minimal amount of salt needed for treating the skin (at least 25% of the crude hide) and the covering capacity (expressed in square meter) according to possible animal origin.

	Weight of the crude hide (kg)	Salt used for its treatment (kg)	Resulting weight after salting (kg)	Surface (m2)
Goat	2.3	0.6	0.7 -0.9	0.55 – 0.65
Sheep	2.1	0.6	0.7 – 0.8	0.55 – 0.65
Calf	8.1	2.1	3.8	1.5 – 1.2
Cow	12.5 – 14.5	3.1 – 3.6	5.5 – 6.4	2.0 – 2.5

The Roman army was by far the biggest market for tents. It used leather tents almost exclusively to help troops to rest under cover and to preserve vulnerable equipment and food. Under the Republic, it is ascertained that legionaries spent winter campaigns in their leather tents. The term *sub pellibus* appears in several texts describing the conditions under which they camped while on campaign, difficulties arising in winter due to bad weather:Cicero, *Acad. Quaest*. II, 2, 4

Livy, *Roman History,* V, 2, 7: *militem Romanum [...] sub pellibus durare.*

Tacitus, *Ann*. XIII, 36: *Retentus qui omnis exercitus sub pellibus quamvis hieme saeva adeo ut, obducta glacie, nisi effosa humus tentoris locum non praeberet*. *Ann*.XIV, 38: *Contractus deinde omnis exercitus sub pellibus habitus est.*

Florus, *Abr. Roman History*, I, 12: *Tum primo hiematum sub pellibus...*

Amm. Marcel. Hist. XIX, 11, 4: [...] *nostrique pruinis subdinales moras difficile tolerabant*.

The army on the western frontiers amounted to about 102 000 legionaries and an equal number of auxiliary troops, at least a total of 200 000 men. The legions included 3 in Britain, 4 on the Rhine, and about 10 along the Danube. They were estimated by Drummond to use approximately 1.5 million calfskin panels cut from the hides of 750 000 calves for shelter, which means the slaughtering of 132 000 in Britain, 176 000 in Rhineland, and 440 000 in the Danube area (livestock heads). Each calf hide yielded about 6 square feet of tent leather, or two panels. The only point in such a calculation is the uncertain predominance of calfskin due to the wide extent of goatskin use according to other sources. It has been estimated that a legion required the hides of some 65 700 goats for the tents it used. Pieces of tent of both goatskin and calfskin have been found. In Vindolanda tents were made from thinner goatskin and often showed signs of repair and patching throughout their period of use.

According to various descriptions (Polybius, Livy, Caesar, Appian), the size of the Republican legion fluctuates from as low as 3000 to as high as 6000 men, and from 200 to 400 regarding the *alae* (cavalry). Later on, the Army issued regulations governing everything from officer's duties to the pattern of military tents. Estimates of the Imperial legion continue to vary to a large extent. There was, however, a standard size, i.e. 4800 men divided into 60 centuries of 80 men each. The size of the basic tent was set at 8 men. Both Polybius (200-118 BC) and Hyginus (under Trajan) wrote treatises on camp layout which show two different designs, obviously evolving from one another. Anyway, men were posted as sentries while the remainder was to erect the leather tents in orderly line. As 16 men per century were constantly posted, each century occupied only 8 leather tents. In the case of 100 tents allocated to a *cohors milliaria*, ten of them were for the centurions. This attribution leaves 90 tents to be distributed amongst the 10 centuries. *Cohors pedita miliaria habet centurias X, tendit papilionibus C, ex eis centuriones singulis* (Hygin, *Castramet*. 28). According to commentators, this would have required 588 calf skin panels. Whereas the western Army numbered about 200 000 men, using approximately one and a half million calf skin panels, the later would have been cut from the hide of 750 000 calves. Many tents were made from thinner goat skin inducing a higher number of panels, 70 per papilio.

Many examples of tent panels are known, whole or fragmentary, but Vindolanda has produced panels that can be linked together by the stitching patterns and has provided the model for actual reconstruction of a Roman tent. Fragments of skin panels have been uncovered in the archaeological excavations of a number of military sites, especially along the *limes*. Tent panels have been a focus of leather research since the discovery at Birdoswald of a number of such panels (McIntyre and Richmond, 1934). Panels that can be linked together by the stitching patterns have provided the model for actual reconstitution of a Roman tent under the Empire. Details with this respect are to be found in the article entitled 'New light on old tents' by Carol Van Driel Murray (Journal of Roman Military Equipment Studies, I, 1990).

Considering the number of tents that would accompany an army on campaign, the western frontiers constitute a privileged area for leather archaeology. Considering only tents and sacks, Britain had to supply over 180 000 hides, the Rhineland 241 000, and the Danubian area over 500 000. As a matter of fact, tents and sacks represented only a fraction of the leather required by the Army.

Tents were constituted of a number of standard-sized leather panels. Leather used for cutting them was basically calfskin or goatskin. Each standard tent (*papilio)* required 50 panels when made of calf hide (each calf hide yielded about 6 square feet of tent leather) and up to 70 when made of goat hide. Salt needed for a calf skin tent amounts to about 100 kg.

	2nd Century BC (Polybius)	2nd Century AD (Ps. Hygin)
Roman army (total strength)	164 000	285 000
Tents made up (by skin type)	20 500	46 900
- Goat	14 350	30 485
- Sheep	2 050	2 814
- Calf	3 075	5 628
- Cow	1 025	7 973
Salt used (by tent type) in tons	1 071	2 635
- Goat	603	1 280
- Sheep	72	98
- Calf	307	563
- Cow	89	694

With a pinch of salt

Since the early 80's salt in Antiquity has been a subject of research. Literature was again investigated for getting constructive answers to basic questions: where has it been harvested or extracted? how was the supply meeting the demand in terms of volume? Referring to 'a remarkable study by Adalberto Giovannini', Julio Mangas explains how to properly develop estimates with regard to livestock, taking an accurate example in the Vetton population. A summary of both articles might be helpful.

Giovannini assumes that global salt consumption, within a population which partly depends on livestock, is easy to calculate when combining Cato's slave (7 kg per annum) and Aristotele's sheep (42 kg per summer). Moreover, referring to current Swiss rations, he considers that total requirements for central and meridional Italy in the second century BC should not be less than 20 kg. Whereas the related population was supposed to amount about 3.5 million inhabitants, salt demand should have been about 70 000 tons. According to other elements which are not clearly defined, he concludes that the supply was widely ensured by the salt gardens of Ostia (20 000 tons), Salapia (Margherita di Savoia) and a few other places.

The selection criteria of this tentative profile deserve much ncritical analysis, as the corresponding input is too selective for the population at large.

- Direct consumption (dietary salt?)...2.5 kg/year..7 g/d
- Livestock breeding.....15.0 kg/year
- Salting/Curing.....15.0 kg/year
- Total.....32.5 kg/year

By reference to Cato, 2.5 kg/year is presumably lower than it should have been. According to Milne-Edwards (1850) 4.5 kg/year would have fit the needs. Schleiden (1875) proposed the figure of 7.5 kg/year, but for which needs? And, how might cattle breeding and fish salting be combined? Why not segregate human consumption on the one hand and animal feeding on the other hand such that reliable figures would be revealed?

When concentrating on livestock activities, it is of a paramount importance to segregate specific strata of the population as a starting point. This is precisely what is attempted by Julio Mangas and Maria Rosario Hernando. They have developed what they call 'un modelo de analisis' which is more precisely in line with what we expect to become a gold standard. For this purpose, they have revealed a community of cattle-breeders, 'la del castro de la Mesa de Miranda' (Chamartin de la Sierra, Avila) dated to III-IIth Century BC according to several campaigns of excavation. This community is estimated at 440 individuals. In relation to them, both Spanish scholars have built up the following profile.

Number	Per head and per year (kg)	Total volume (kg)
440 individuals	2,5	1100
50 horses	18	900
300 sheep	2	600
100 goats	2	200
50 cows	20	1000
300 pigs	6,5	1950
Food salting	5,5	2420
Total		8170

Source: *La sal y la Historia romana*, p. 20.

When analyzing the Vetton population, they consider there were at least a hundred communities of the same configuration and conclude, consequently, that the Vettons needed a yearly minimum of 800 tons of salt. A paper by Carrera Montfort is aimed at evaluating the general population of Roman Spain. In its conclusion, he encourages scholars to apply its pattern in order to help understand the various aspects of that country's economics.

There are many sides to every question as a result of the infinite degrees of differences in scholars' opinions. Another approach is suggested hereunder. *Oleum dato in menses unicuique; salis unicuique in anno modium satis est* (*Agr*. 58). According to Cato the Elder (234-149 BC), the amount of salt attributed to slaves working on his estate totals one modius per year within the framework of the *pulmentarium familiae.* This reservation expresses what he has in mind: he means salt for dietary requirements. Moreover, he specifies that this quantity is fairly enough for them to live on. Larger quantities might be needed for a large number of people due to activities like stock breeding.

From this starting point, a tentative profile per capita can be established, although statistical data are wholly

or partly lacking as regards salt input in his age, i.e. second Century BC.

Salt for	Per annum per capita	Per diem
Dietary uses	1 modius (7.3 kg)	(17 g)
Animal feeding[2]	4 modii (29.2 kg)	9 g /sheep, 24 g / cow
Hides and skin	>1 modius	2.1 kg per calf skin
Fish salting, meat curing[3]	>1 modius	½ modius per ham
Vegetable preservation	<1 modius	
Non specified	<1 modius	
Total	9 modii	

The requisite conditions for any significant calculation regarding salt for animal feeding are lacking, especially figures related to the different flocks (sheep, pig, goat, cow, horse). Horses do require about 1 to 2 ounces of salt per day. This requirement can increase to 4 in hot climates or under exercise. A milking cow producing 20 L/day requires Na 15 g/d i.e. 36 g of salt. This compares with the needs at Na 3 g/d i.e. 7.2 g of salt for maintaining live weight. Animals deficient in salt develop a craving for it.

Referring to Polybius, population estimates by Brunt (1971) contribute to drawing a table related to Italian manpower in this very period.

Italian Population	Citizens (thousand)	Grand Total	Surface (km^2)
	Romans = 923		26 615
	Latins = 431		10 630
	Allies = 1 398		71 545
	Others = 210		n.a.
	2 962[4]	3 512[5]	107 790

Whereas it can be assumed that one modius is a minimum for the population at large, it is possible to calculate a threshold for the production of salt in Italy. We have only to multiply 7.3 kg by 3.5 million to obtain 24 550 tons. Although it would be extravagant to take 9 modius as a base for the general population, it is nevertheless advisable to balance data for any further calculation by paying attention to the main outlets for which large quantities of salt are needed. Would an estimate up to 50 000 tons be totally unrealistic? For a proper balance of both requested salt and the concerned population, a rough estimate of 37 000 tons is proposed.

It must be stressed that the calculations offered above cannot pretend to bring anything more than a tentative profile. The same should be attempted for the Augustan period, with two major differences: the percentage of inhabitants who are not concerned with animal feeding is fairly higher than two centuries ago, and a reverse trend is hypothesized for salsamenta.

Salt for	Per annum per capita	Per diem (examples)
Dietary uses	1/2 modius (3.4 kg)	(8.5 g)
Animal feeding[6]	4 modii (29.2 kg)	9 g /sheep, 24 g / cow
Hides and skin	>1 modius	2.1 kg per calf skin
Fish salting, meat curing[7]	>2 modius	3.7 kg per ham
Vegetable preservation	<1/2 modius	
Non specified uses	<1/2 modius	
Total	7 1/2 modii	

Undeniable facts and figures are scarce. Something like the two appended sheets should be included in future considerations of salt in Antiquity. It would need to be based on various sciences and literature: history, epigraphy, archaeology, geography, economy, demography, sociology, medicine, veterinary, iconology etc.

Salt was an object of particular solicitude to the Roman republic on the eve of its decline nor to the imperial dynasties. The fact that salt was produced extensively at inland brine springs that were also centers of stock breeding was not to obfuscate the fortune of immensely productive limans and artificial ponds where sea water, sufficiently concentrated by solar heat, began to deposit salt on drying up. One factor is inherent in the determination of actual salt consumption in Antiquity: the remark that salt was not a major source of revenue and did not generate government interest. Writings on the relative importance of salt outlets are somewhat inconclusive. Although salt was used in a number of activities where its action was required, modern analysts have preferred to focus on human and animal diet. Recent books have been published with the objective to enlarge the tour d'horizon.

[2] One medimnus = 4.62 modii. According to Aristotle, this amount is valid for 100 sheep in summer time.
[3] Half a modius per ham
[4] Together with the Cisalpine, Italy would total 3.9 million inhabitants.
[5] Including 550 thousand slaves.
[6] One medimnus = 4.62 modii. According to Aristotle, this amount is valid for 100 sheep in summer time.
[7] Half a modius per ham

Salt profiling and selection criteria (part one)

Sources	Production profile	Consumption profile
Cato, *Agric*. 58		Slave's ration: 7,3 kg/year
Hist. Aug.		Legionary's ration
	Fish salting	
	- *salsamenta*	50,00% of fish weight (average)
	- *liquamen*	25,00%
Géoponics, 20, 46	- *garum*	12,50%
	Meat curing	Pork ration (*annona*)
Cato, *Agric.162*	- ham (*perna*)	3.7 kg/ham
	- other specialities (*laridum*, etc)	
Aristotle, *Hist. Anim*. 8, 12	Stock breeding	Sheep: 0.42 kg/ summer
	- milk	Dairy products
	- hide and skin	Leather goods
		- tents
		- battle dress
		- shoes
	- wool	Textile fabrics
Cato, *Agric*. Agr. 24; Pliny, *NH*	Wine stabilization	7.3 kg/520 L
	Olive preservation	

Salt profiles (part two)

Period	Population	Geographic region	Soc.eco. categories
2nd Century BC	200	Rome	
			- citizens
			- slaves
	4 to 6 million	Italy	
	3.4 to 4.4		- citizens
	0.6 to 1.6		- slaves
Augustus	750 000 to 1 000 000	Rome	
	ca. 75 %		- free
	ca. 25 %		- slaves
	14.2 to 16.0	Italy	
	13.2 to 14.5		- free
	1.0 to 1.5		- slaves
2nd Century AD	60.3 to 67.9 million	Empire	
	55.5 to 59.5		-free
	4.8 to 8.4		- slaves
Marcus Aurelius	ca. 64 million	Empire	

References

Bekker-Nielsen, T. (ed.) 2005. *Ancient fishing and fish processing in the Black Sea region*, Aarhus University Press.

Brunt, P., A. 1971. *Italian Manpower (225 BC-AD 14)*. Oxford University Press.

Carreras Monfort, C. 1995-1996. A new perspective for the demographic study of Roman Spain. In *Revista de Historia da Arte e Arqueologia 2*: 59-82.

De Blois, L. and Lo Cascio, E. (eds.) 2007. *The impact of roman Army (200 BC – AD 476)*. Brill.

Drummond, S., and Nelson, L., H. 1994. *The Western frontiers of Imperial Rome*. Sharpe, New York.

Erdkamp, P. (ed.) 2007. *A companion to the Roman Army.* Malden, Blackwell Publishing.

Erdkamp, P., Verboven, K. and Zuiderhoek, A. (eds.) 2015. *Ownership and exploitation of land and natural ressources in the Roman world.* Oxford, Oxford University Press.

Forbes, R., J. 1966. *Studies in ancient technology. V.* Brill.

Giovannini, A. 1985. Le sel et la fortune de Rome. *Athenaeum* 73: 373-387.

Glasbergeb W. and van Waateringe, W., G. 1974. *The Preflavian garrisons of Valkenburg*. Amsterdam, London: Verhandelingen der Koninklijke Nederlandse Akademie van Wetenschappen.

Grandazzi, A. 1997. *The foundation of Rome: myth and history.* Cornell University Press.

Hin, S. 2013. *The population of the Roman Italy: population dynamics in an ancient conquest society (201 BC-AD 14)*. Cambridge, New York: Cambridge University Press.

Kamash, Z. 2010. *The archaeologies of water in the Roman Near East.* Gorgias Press.

Kay, P. 2014. *Rome's Economic Revolution*. Oxford University Press.

Leslie, A., F. 1995. *Roman temporary camps in Britain*, Appendix i: Roman military tents. Unpublished PhD thesis, University of Glasgow.

Mangas M., J. and Hernando S., M., Del, R. 1990. La sal y las relaciones intercommunitarias en la peninsula iberica durante la Antiguedad. *Memorias de Historia Antigua* 11: 219-231.

Marzano, A. 2013. *Harvesting the sea – the exploitation of marine resources in the Roman Mediterranean*. Oxford University Press.

Maxfield, V., A. and Dobson, M., J. (eds.) 1991. *Roman frontier studies: proceedings of the XVth International Congress of Roman Frontier Studies*. Exeter: University of Exeter Press

McIntyre, J. and Richmond, I., A. 1934. Tents of the Roman Army and leather from Birdoswald. In *Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society. New series* 34: 62-90.

Moinier, B. 2013. Legiuni şi unităţi auxiliare în marş – despre sare şi organizarea castrelor/Légions et auxiliaires en marche – du sel et de la castramétation. In *Istros* 19: 353-388.

Morley, N. 2007. *Trade in Classical Antiquity*, Cambridge: Cambridge University Press.

Roth, J., P. 1998. *The logistics of the Roman Army at war (264 BC-AD 235)*. Brill.

Southern, P. and Dixon, K., R. 1996. *The late Roman army.* New York: Routledge.

Stallibrass, S. and Thomas, R. 2008. *Feeding the Roman Army: the archaeology of production and supply in the NW Europe*. Oxbow Books.

Stockinger, U. 2015. The salt of Rome – Remarks on the production, trade and consumption in the north-western provinces. In Robin Brigand and Olivier Weller (eds), *Archaeology of Salt. Approaching an invisible past*: 183-198. Leiden: Sidestone Press.

Trakadas, A. 2005. The archaeological evidence for fish processing in the Western Mediterranean. In T. Bekker-Nielsen (ed.), *Ancient fishing and fish processing in the Black Sea region*. Aarhus University Press.

Twine, K. 1992. The City in decline: Rome in late Antiquity. In *Middle States Geographer* 25: 134-138.

Underground Waters as a Source of Salt: Reflections on the Technological Variations of their Use in the South of Mexico

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Abstract

The southern central area of Mexico is a mountainous zone in which orogenic phenomena have left many marine formations from the Cretaceous period over 60 million years ago exposed, along with recent volcanic formations. In this part of the country subterranean water flows that pass through ancient marine deposits create natural brine, which emerges at different points in the current mountainous landscape. The raw materials for the production of salt are these saltwater springs, and their presence has been the object of knowledge and control for at least 2500 years. Here, I present a general characterization of these saltwater resources in the Mixtec region, indicating the technological variants of this knowledge and control which have led to the development of small scale water management systems for salt production in inland regions. I also show how salt has been historically obtained through several methods up to present times. I consider the differences among these springs, some religious beliefs associated with the salt making sites, and other details of local knowledge concerning the presence of subterranean water.

Keywords: Salt waters, Salt technology, Archaeology of Salt, Ethnography, Water Control Systems, Religious Beliefs, Symbolism of Salt, Puebla, Mixteca, Mexico.

Introduction

In the wide mountainous territory that extends across the southern central part of Mexico, mountain formations of volcanic origin make up the Mixtec region that stretches from east to west, dividing the country into two halves. In this extensive and rugged landscape, there also exist geological formations from older times that constantly emerge through seismic phenomena. As water filters through the uneven relief of this landscape it washes away what were once beaches and sea floors that existed millions of years ago. It is not unusual to find fossils of those times in great quantities. The underground water, filtered in this manner, is concentrated into many places where the slopes and geological faults allow it.

It is thus that multiple zones with saltwater springs that change their concentration of salts according to the time of year exist in this region. Normally, the months of greater concentration of salt in the underground waters are between February and May, although there are occasional rains during that time. The concentration of salts is maintained through the months of June and July, followed by the rains that reduce the salinity, with it only rising again in December and January. The exploitation of these natural salt water sources has stimulated the implementation of very ingenious water management systems, which are part of the larger and more complex hydraulic systems that were used for agriculture. Currently, salt in the Mixteca is produced through the solar evaporation method, which may possibly have been used during the pre-Hispanic era, but which surely marked a strong technological change during the sixteenth century. At that time, the Europeans introduced the use of ponds or open spaces with a floor of stones coated with lime for solar evaporation in the style of those located around the basin of the Mediterranean. Before that, solar evaporation using facilities of pre-Hispanic types was surely combined with the method in which crystallization results from the application of heat from fire, and in which the use of small clay containers results in the formation of salt cakes, but this method disappeared completely after Spanish colonization (Castellón in press).

In this article, I shall attempt to show how it is that the use of underground saltwater involves a less visible but just as ingenious water management system that operates on a smaller scale parallel to the larger agricultural systems. In some respects, the saltwater system may be seen as a case of experimentation with possible solutions for agriculture, but with results oriented to obtaining an inert nutritional product that is a symbolic complement to the products of agriculture. It may be considered that the production of salt in these regions is in many ways a type of 'metaphorical agriculture,' if we imagine that in place of soil, water is sown, from which the grain of salt sprouts after certain care is taken.

The natural environment

There are at least four conglomerations of saltworks along the border between the states of Puebla and Oaxaca (Figure 1), which present evidence for the use of these waters since at least AD 700 or earlier, and which

continue to be used. These are Zapotitlán, Tlaxcuapan, Chila, and San Ildefonso. These regions have a semi-humid climate with a shortage of water, where agriculture that takes advantage of natural slopes and which involves the use of terraces, small check dams, and irrigation canals is practiced. The landscape is of low vegetation, with plants adapted to the shortage of water and a large quantity of cacti.

Saltworks are located regularly in steep-sided gorges of the most abrupt elevations, and not too far from near the town centers, though there are exceptions in which the town itself is settled in the salt-producing locations, such as in San Ildefonso, Oaxaca, and Ocotlán, Puebla, where the people live around the production areas. It is difficult to find a way to integrate domestic spaces, agricultural practices, and salt production and it is therefore more common to have the town centers at a distance of 1km or more away from the sources of salt, and to establish terraced fields for cultivation near the salt gorges, but in more elevated positions. In most cases, the salt is produced in somewhat distant sites

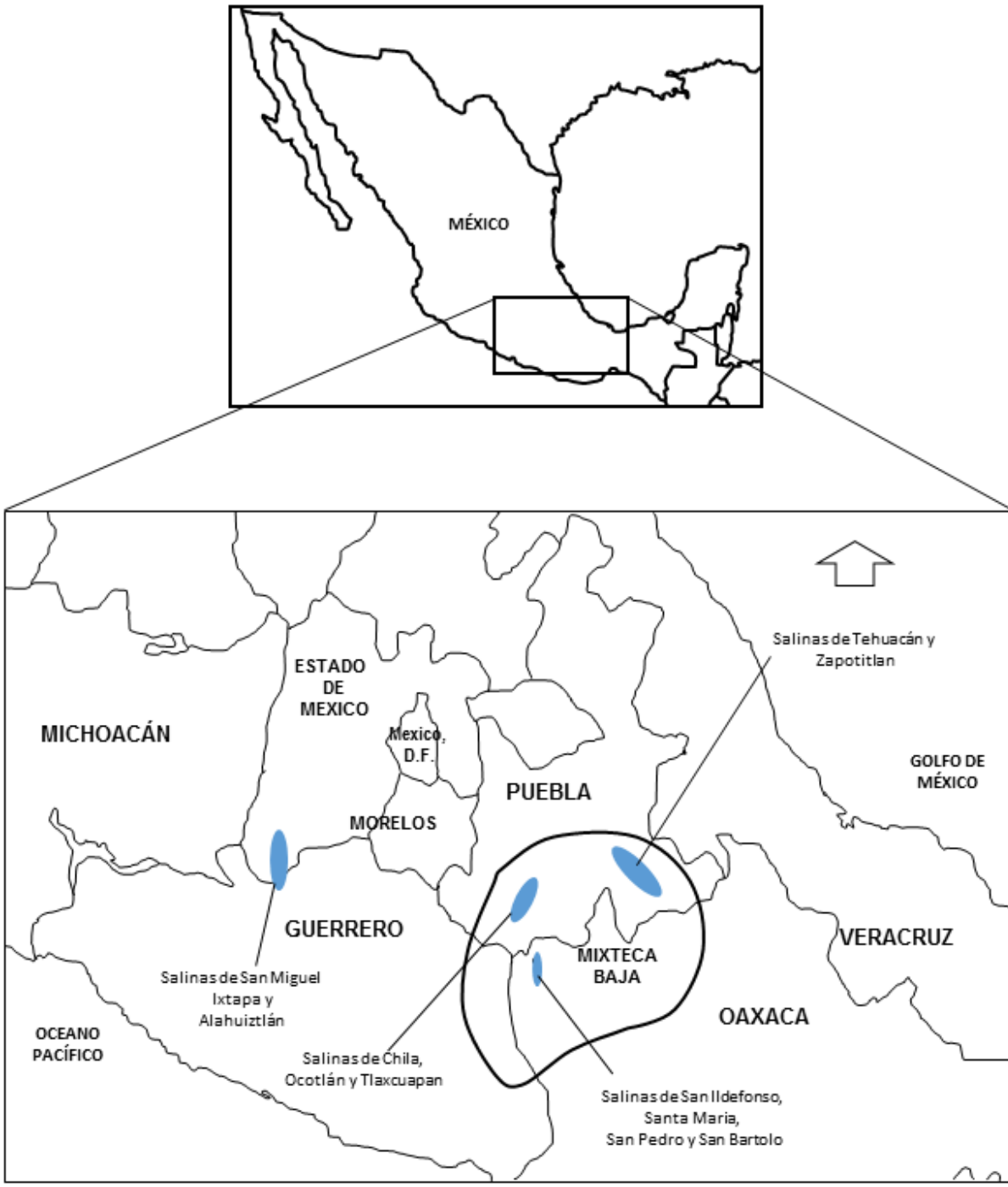

Figure 1. Map showing the location of main salt production areas in the Mixtec region in south-central Mexico (Drawing by B. Castellón).

to avoid contaminating other activities, since salt in Mexico has traditionally been considered a residue of the bodies of ancestors or of the gods (Castellón 2015: 74; Osorio 1998), and for the same reason it is better to keep this activity far away from places of human habitation. The salt-producing sites are commonly called 'estates,' which consist of a number of terraced solar evaporation ponds, made of stone and lime, belonging to a family. Several families share one or several nearby wells or water sources which they use to fill their ponds and initiate the salt production process. Sets of saltworks or estates are sometimes dispersed, but in many cases they are compact concentrations of more than 200 or 300 solar evaporation plots without intermediate spaces, traversed by small canals and fed by various sources of water adapted to the construction of these salt work complexes (Figure 2).

The complexes are always composed of a series of interconnected spaces with a pronounced slope that is enclosed by surrounding elevations that are favourable to establishing a water management system on a small scale. The saline water is available at low points in the gorges at the foot of the elevations and in certain places where the saltworkers themselves know that it is close to the surface. They look for it by digging and creating a small catchment area, and they do the same where natural springs, from the ground. Its presence can be detected by differences in the vegetation and even by the colour of the earth. The ways in which the water is controlled once it comes out to the surface are varied. Sometimes it flows naturally into a small well formed by the wear of the water's movement itself. In this case the springs are not very large, with average diameters of 40cm, although the depressions always have a pear shape since the water immediately runs to the nearest slope. From there it is channelled or captured in a reservoir. Whatever the source, the saline water, the raw material for making salt, must always have a natural and easily controllable drainage. This is what gives origin to these special water management systems at sites with slopes and little vegetation.

In most cases the water sprouts with low pressure but in a constant jet, with an average speed of 200ml per second, and with a pH between 7 and 8, a neutral level of acidity. The temperature is normally higher than 20°C, indicating that the underground stream is most often not very deep. Regardless, its collection in wells or catchment areas favours the precipitation of the salts extracted in the salt production process (Flores and Cazares 2015) (Figure 3).

The catchment wells

Many springs have been adapted since ancient times to be accessed by stairways. These days this is the most common practice, and in most cases the wells to hold the water are built in the same place where the springs are, with a parapet raised around the point where the water sprouts **from** the ground. Some wells of smaller dimensions do not have these parapets (Figures 4 and 7). Commonly at current salt production sites the wells are lined with internal walls that may have different diameters, from a meter or less to more than five meters, depending on the terrain, the slope, the depth of the water, the underground rock, and the antiquity of the well. Still, there are currently many wells that do not have walls among the evaporation saltworks.

Is important to mention that the rock in these locations is mostly limestone, resulting from very old

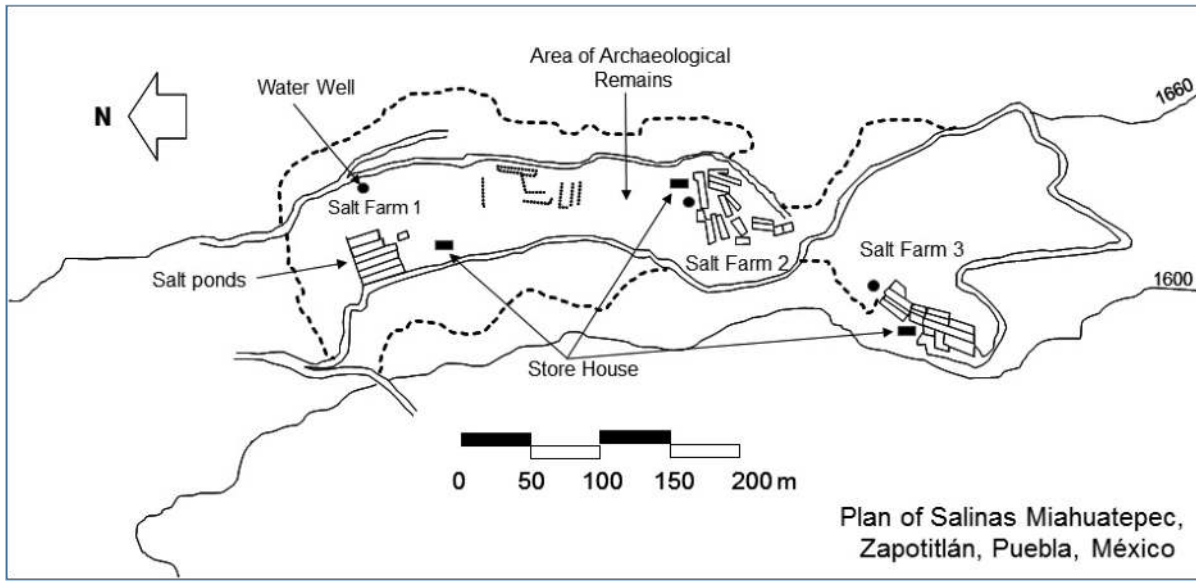

Figure 2. Plan of Salinas Mihuatepec, Zapotitlán, Puebla, located on steep slopes. Three areas of salt production can be distinguished (Drawing by B. Castellón).

ZAPOTITLAN REGION

Sample	C %	O %	Na %	Mg %	Al %	Si %	S %	Cl %	K %	Ca %	Sr %
4	0.0	20.68	32.2	0.0	0.0	0.0	0.6	45.11	1.42	0.0	0.0.
5	0.0	9.42	36.11	0.0	0.45	0.0	0.39	52.76	0.87	0.0	0.0
13	0.0	10.89	38.15	0.0	0.0	0.0	0.0	50.96	0.0	0.0	0.0
14	9.73	15.15	34.2	0.0	0.0	0.27	0.61	40.03	0.0	0.0	0.0
15	0.0	7.49	35.38	0.0	0.0	0.0	0.0	56.46	0.67	0.0	0.0
16	0.0	4.5	37.77	0.0	0.0	0.0	0.0	57.73	0.0	0.0	0.0

TLAXCUAPAN, CHILA, OCOTLÁN, PUEBLA

Sample	C %	O %	Na %	Mg %	Al %	Si %	S %	Cl %	K %	Ca %	Sr %
3	0.0	5.62	37.01	0.0	0.0	0.0	0.6	56.64	0.74	0.0	0.0.
11	0.0	58.78	30.01	0.81	0.0	0.0	2.4	6.4	1.17	0.42	0.0
18	0.0	13.11	32.6	0.69	0.0	0.0	1.39	50.58	1.64	0.0	0.0
19	0.0	45.86	28.11	7.06	0.0	0.0	1.29	16.87	0.81	0.0	0.0

Figure 3. Chemical composition of salt waters in Zapotitlán and three other Mixteca sub-regions (After A. Flores and P. Cazares 2015).

Figure 4. Some examples of salty water wells currently used. Salinas Las Grandes, Zapotitlán, Puebla (Photos by B. Castellón).

sedimentation processes, although sometimes volcanic stone may be obtained to reinforce the constructions. In all observed cases, the availablility of rock as a resource and its acquisition for construction is part of the salt production process (Figure 5).

The access stairways may consist of two or three parallel steps if the water is close, or deeper spiral stairways leading up to four or five meters below the surface, which gives the wells the appearance of towers submerged in the earth. The entire saltworks landscape of the Mixteca is covered by rock walls, on the terraces where salt evaporates, and in the wells and water containers made of rock, making it easy to distinguish where the saltworks are located from a distance, if the mountains do not impede the view.

The sources of water require constant repair, desilting, cutting, construction and extension of internal walls. The wells are occasionally abandoned and used again depending on the flow of water. A new spring may be located to explore its potential. Saltwater has been extracted directly since ancient times using clay containers that could hold approximately 10L. This was an exhausting labour that required constant coming and going to the water source, up and down the stairs with the risk of slipping, getting hit and falling into the well, which has happened on many occasions, causing the death of the workers by drowning. These people walked the stairways with bare feet and little clothing; their pots were sometimes protected with strings to keep them from soon breaking due to frequent use, and once full of water, they were held by the edges with two hands and carried up the stairs in this way. The workers who did this were known as `cienteros` (`hundreders`) because they charged for their work by every one hundred water trips, and during their lifetime they developed very strong legs, which were necessary for this labour (Figure 6)

This type of manual labour was the custom in these saltwork spaces for centuries to obtain the raw materials but quickly disappeared around the 1970s, when it became possible to use gasoline-powered pumps and plastic hoses to extract the water. However, these recent technological innovations have not changed the perception of these places (Figure 7). The water wells continue to be dangerous places where people can die if they do not have the appropriate ritual attitudes. Normally, a simple offering of flowers or food is placed near the wells, and a small celebration must be done on the third of May, which in Mexico is a day that corresponds to the day of the Holy Cross and is dedicated to construction workers in particular, but in this case also to saltworkers. This date indicates the start of the first rains, in itself marking the beginning of the agricultural period, and in the case of the Mixteca, is one more parallel between agricultural and saltworker practices. The wells and water sources are also the dwellings of supernatural beings that have inhabited the underground and aquatic world since pre-Hispanic times. Thus it is important to observe the rituals, since the action of taking the saltwater is removing something that belongs to these beings, which may cause them to become angry. At the end of this article, I shall make some observations about these beliefs.

The protective walls built around the spring, if the spring is large and its flow constant, are continuously being expanded, resulting in the formation of an irregular pattern such as can be observed in various saltworking sites. The wells and springs where the water emerges may be abandoned if the water table

Figure 5. Example of saltworks located in ravines and steep slopes, and the use of limestones to build terraces for evaporation ponds, Salinas Miahuatepec, Zapotitlán, Puebla (Photos by B. Castellón).

Figure 6. Modern recreation showing the usage of large pots to transport salty water from the water wells into the evaporation ponds (Photos by courtesy of Comisariado Tlaxcuapan, Piaxtla, Puebla).

Figure 7. Current usage of gasoline pumps and plastic hoses in ancient water wells. Salinas Las Grandes, Zapotitlán, Puebla (Photos by B. Castellón).

recedes, but are reused if the water appears again. Thus the sources are constantly evaluated to calculate their potential for use.

The water transmission towers

Variations in the elevations of water sources relative to the elevations of the evaporation caused a search for solutions, particularly when a source was not on the surface or when the receiving evaporation ponds were at a higher level than the water source itself. One very old solution employed until around the 1970s, consisted of hauling water in clay containers, as was previously mentioned. Water management entailed calculating the slopes required to drive it through small canals that distributed it among the evaporation ponds. This was a simple task when the water source was upslope from the ponds, as at the Zapotitlán site of 'Las Chiquitas' and other nearby sites. But it was a problem when the situation was the opposite, as when the source was located near bottom of the gorge, where the main current draining the water from the terrain is located. In this case, the water must generally be moved to the higher level where the terraces with evaporation ponds are located.

The solution consisted of building stone towers with stairways that measured an average length of four metres at the base and a similar height of four metres, with around 15 steps 25cm wide, although the dimensions were occasionally larger (Figure 8).

On top of these towers was a square container with a capacity of more than 40L and a lateral exit connected to wooden pipes that carried the water the required distance to the evaporation ponds. The pipes were hollow logs from the agave plant, called 'quiotes,' which can have a length of nearly 10m and are water-resistant. These were placed horizontally and gently sloping, shored up over vertical forks in the manner of a bridge. The use of this construction required great physical effort by the saltworkers hauling the water, especially if the water was being transported from a deeper well, and the log pipes being of an organic material required constant repairs. However, the device solved the matter of rapid conduction of the water from the source to the ponds. Presently, the towers remain as mute witnesses of times past, as they are no longer in use.

The underground galleries

Another solution for the differences in levels involved the construction of underground canals consisting of interconnected trenches. This was applied when water from an underground source had to be taken from

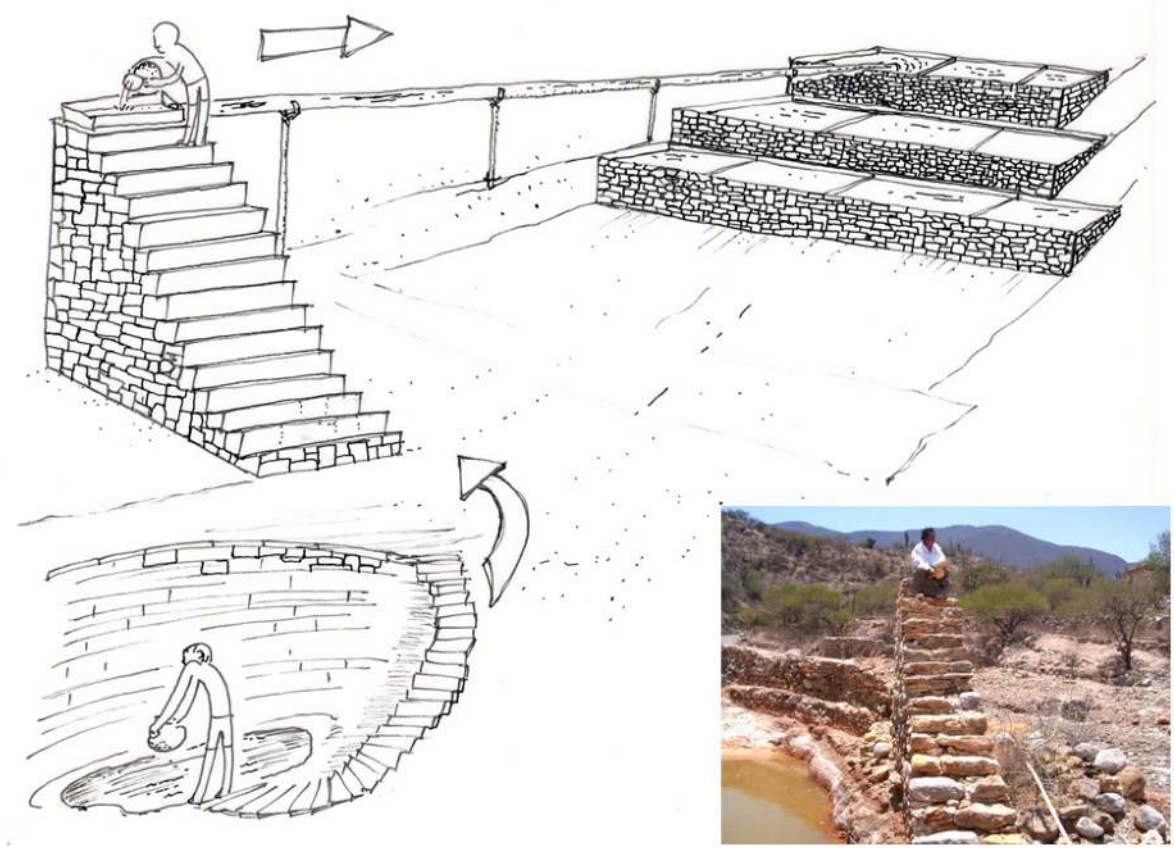

Figure 8. Representation of stone towers and wooden pipes used to move the salty water to a higher level until de middle of Twentieth Century. Salinas El Rincón, Zapotitlán, Puebla (Drawings and photo by B. Castellón).

the source to evaporation ponds on the surface, and to avoid contamination through use of an open sky canal. This solution is opposite to the previous one and implies an intention to keep the saltwater from being exposed to the open air for long stretches, to avoid changes in its mineral composition. The work this solution required was more complicated, because it was done underground and was an artificial prolongation of the underground source of the water itself. From the water source, a small tower, such as those previously mentioned, was built, and from there, the water ran through a canal that carried it out horizontally to a sloping part of the terrain (Figure 9).

Under these circumstances the underground canal was built such that different stretches were linked by vertical shafts through which one could observe the movement of the water and descend if necessary to remove built-up sediment. In the documented case, the canal runs a distance of approximately 100m from the water source, making it a smaller relative of the groundwater filtering tunnels, or qanats, that are well known from Mesopotamia, but which were also built in Andalusia and other parts of Europe. In Mexico, there are examples of these great underground galleries for water catchment in the arid regions of the Mixteca during the colonial period (Neely and Castellón 2014: 188-189; Seele 1973). The device associated with the production of salt, however, is no more than an underground canal with a short trajectory meant to solve a problem of different elevations. Nevertheless, its technology makes it evident that the conduction of water from a low-depth underground source over varying distances and levels was accomplished by means of similar methods and local materials. In no case is it about large volumes of water or distances greater than 1km, as occurred with the extensive networks of canals developed in this same region in ancient times for intensive agriculture, many of which still function (Caran and Neely 2006; Neely and Castellón 2003, 2014: 185-187). Salt production continues to be a more modest enterprise that employs much lower quantities of water in much smaller spaces.

The underground cistern

Other cases of water management in the Mixteca use cisterns set into the middle of the saltworks and springs, as occurs in Tlaxcuapan, Puebla. These serve to store the brine during the process and raise its salt concentration, as brine is moved from the cistern to each evaporation pond and back to the cistern, in succession, becoming more concentrated each time (Figure 10). Such cisterns are in the shape of a large globular pot and are known locally by the Mexican terms: *coscomate* (grain storage vessel), *atotolinera* (water heater), or with the Spanish

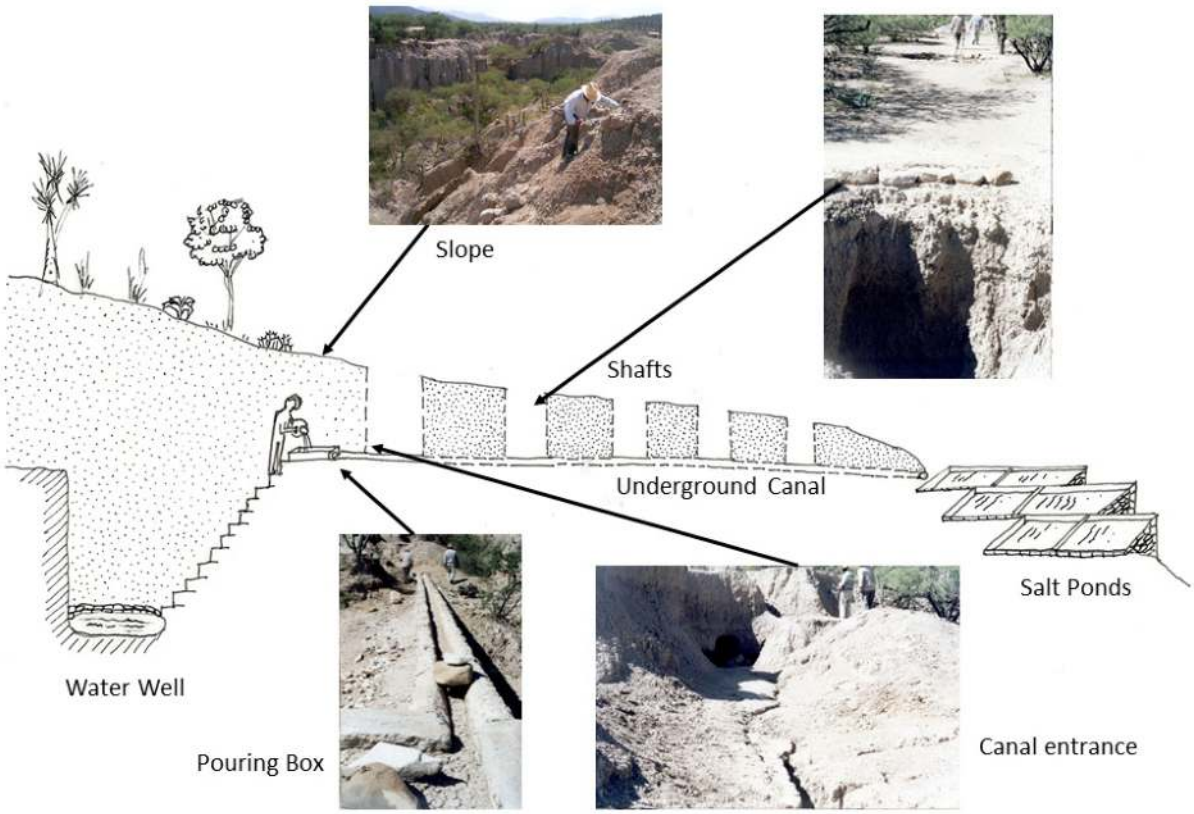

Figure 9. Cross section of a subterranean canal to move salty water down to a lower level, Salinas La Viuda, Zapotitlan, Puebla (Drawing and photos by B. Castellón).

term *troja(e)* (granary). It is evident that these words are derived from 'agricultural' language given to salt production and brine treatment as if salt were a grain that germinates.

The cisterns vary in shape and size. In Tlaxcuapan they are round with the mouth narrower than the body, having an approximate diameter of 55cm, a height of 50 to 60cm, with a capacity of nearly 200 to 230L. Their function is to promote the warming and concentration of the brine by constantly extracting the water from the interior towards the surrounding evaporation ponds and returning the water to the cistern.

Another documented case is found further south in the town of San Ildefonso and nearby places in the state of Oaxaca. In this location, the underground cisterns are larger and have vertical walls, measuring 1.25m in diameter by 1.20m in depth, and with a capacity of over 300L, although they are not filled completely. It is necessary to move around inside them, and they have hollows in the walls to serve as steps. In the continuous process of moving the water from an evaporation pond to the coscomate, and again to another evaporation pond, there comes a point at which the brine will crystallize, which would take longer if the water were in the exterior pond the entire time. This method also takes advantage of the warm environment, which in this part of the Mixteca is more humid, making it necessary to keep the brine in a continuous process of underground heating. The location of the cisterns beneath the surface where the solar evaporation ponds are situated is also symbolic of placing burying the saltwater like a seed that germinates little by little on the surface until it completes its growth as fruit in the form of crystals.

The use of these small cisterns is very ancient in the entire Mixteca; very similar receptacles were employed as filtration mechanisms to concentrate brine in other parts of Puebla during pre-Hispanic times, but presently their use is more localized between the states of Puebla and Oaxaca, where the weather is warmer and more humid. Besides the use of the underground cisterns, the transfer of water directly from the wells to the evaporation ponds by means of clay containers, employing a vessel with a capacity of over 30L which is submerged in the water and carried on the back, ended in this area in the 1970's. Gasoline pumps are also used today.

The underground currents

Another way which the saltwater resources are managed requires even closer knowledge of the terrain and even the geology of each site. This was briefly observed in the saltworks of Tlaxcuapan where the previously described mechanisms are employed. During the time of greatest activity, around the month of June, the underground water is monitored and controlled throughout the intermediate levels of the gorges where production sites are located. The water necessarily flows down to the lowest part of the gorge by crossing the evaporation ponds, which are elevated into terraces on both sides of the gorge. Knowing the location and level of the underground flow, small wells may be opened to extract the water and in this way control the level. At the same time in the same areas there are underground currents of fresh water which are controlled in the same way. The saltworkers know quite well at what times the underground waters of either type may be accessed and are able to select between the currents of fresh water and those of saltwater.

It is important to point out that in the driest climates, as is the case in Zapotitlán, the permeability of the soil is very high; the flow of underground water is present at lower levels than the natural drainage of the main river, and the recharge is very slow. In more humid zones, such as Tlaxcuapan, the underground currents are above the main drainage, and are recharged more quickly due to denser vegetation. As a result, in places like Tlaxcuapan, during the salt production season, the saltwater and fresh water aquifers are available very close to each other, and the saltworkers place 'gates' on the ground to avoid contamination and to facilitate use of the water according to the needs of the moment.

The wells are constantly monitored in order to develop a performance model of the underground currents, since the saltworkers know that the saltwater can get mixed up with the fresh water and reduce salinity. They have also experimented with different proportions of salt and fresh waters. When rainwater falls into the cisterns called coscomates where the brine is stored, they remove it the next day to recover the saltwater which is deeper. They know that this principle also applies to the aquifers, but that with them the different speed of the currents can be decisive in the mixture of the different waters.

In the salt production sites control and use of the underground currents is part of the knowledge that allows one to know where a catchment well can be constructed, though decisions in this regard always take into consideration the fact that water disappears quickly due to the sharp slopes, evaporation, and the very permeable ground. Thus almost every saltwork is equipped with very large cisterns or pools of various sizes, where great volumes of water may be stored for months. The saltworkers are always conscious that saltwater is temporary and ephemeral in its flow as well as its salinity, meaning that the system to control it is necessarily limited by those nature-imposed conditions.

Figure 10. The coscomate an underground deposit to keep the brine warm and speed its concentration. Examples from Tlaxcuapan, Puebla, and San Ildefonso, Oaxaca (Photos by B. Castellón).

The great artificial underground reservoirs

There exists a very notable case in the Mixteca, in which the underground repositories for storing and concentrating the brine are of a much greater scale than the simple coscomates previously described. In the saltworks of the town of San Pedro Ocotlán, located in the southwestern part of the state of Puebla, the overwhelming majority of the evaporation ponds are located in the town center in a great compact hive that takes up 2.6ha and is outstanding in its complexity. Over 5000 small evaporation ponds have been present here for centuries constructed on different levels interconnected by small canals. The reason for this concentration is the existence, in the centre of the saltworks, of a great spring which has undoubtedly supplied the saltworkers for many generations since before pre-Hispanic times.

This complex of ponds has the general appearance of a large platform with many compartments, or a great square grid of spaces destined to receive the saltwater. Just as the habitation platforms with multiple rooms on top that were used as apartment complexes in ancient times, were considered space destined for the dead and communication with the underworld, something similar happens here, in the sense that the ponds on the surface are connected to the saltworkers' source of life: the underground saltwater.

No doubt this landscape of solar evaporation ponds surrounding the greater spring has been formed throughout the centuries as a miniature universe comprised of the site where the saltwaters sprout and the containers that transform it into salt. The metaphor of this microcosm on the level of the architecture is complete, as the salt production site is the center of the town where the houses are located, as if it were its central plaza, indicating the point of origin of the primordial waters. People's houses surround this source, and the houses themselves, located within a deep valley, are contained by the hills surrounding the population on all sides.

Returning to the arrangement of the saltworks at Ocotlán, they are small, low-depth ponds for solar evaporation, with spaces no greater than 6 x 8m or less. They are distributed in a complex way among the families of the town, who start the salt process between the months of February and June. The center of this complex is the largest well, which has been transformed over the centuries into a protected and hidden space, to avoid dust and the entry of animals. Currently it is an oval-shaped pond with a maximum

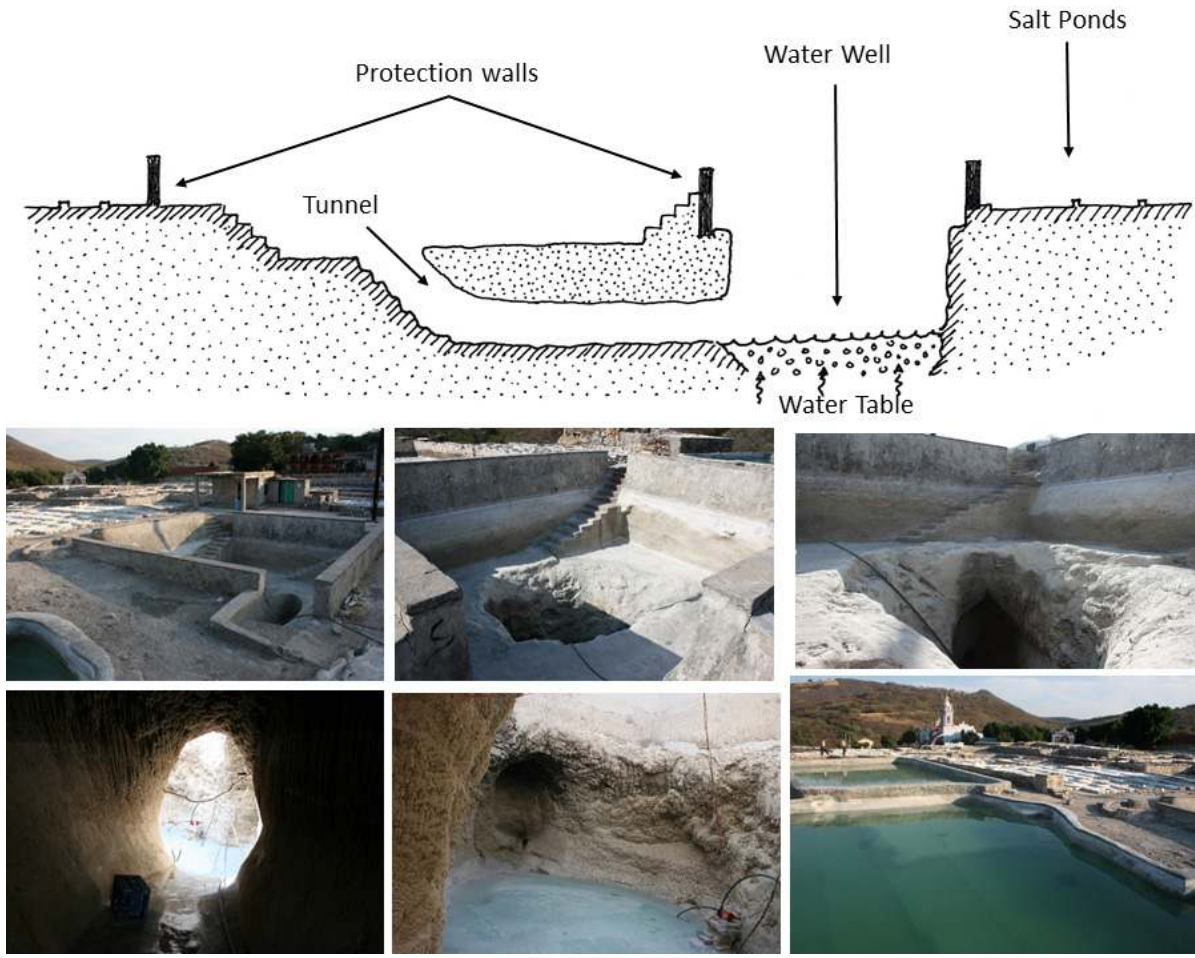

Figure 11. Cross section and diverse aspects of the main salty water well at the centre of Ocotlán, Puebla, and the usage of salt ponds as water deposits (Drawing and photos by B. Castellón).

length of 5-6m and an average depth of 60cm, but where water sprouts at a constant speed of more than 500ml per second, although this must vary over the course of the year. This spring and reservoir are located more than 3m deep below the current surface level, but they are visible from a higher position because they are completely open to the sky, though protected on all four sides by masonry walls rising for another 3m metres above the subsoil rock (Figure 11). The entrance to the well and its spring is through an adjacent walled space with corner stairways leading to a hollow in the rock floor. From there one descends for more than fifteen small steps carved into the rock until reaching a small tunnel 5m long, 2.5m wide and 2.5m high which leads to the spring.

What is truly outstanding about this space is its relatively modern adaptation as a sort of entryway into the underground world where the saltwaters are born. Small crystals have formed in the rock walls due to water filtration, giving it the appearance of a grotto with small stalactites. Upon entering this space there is a very pungent smell of saltpetre or nitrate, and one can permanently hear the water bubbling from the spring at one end of the well; the outer walls and the tunnel magnify the sound. It is a subterranean and humid place where external light penetrates in a limited way, the ideal place to imagine the dwelling of the supernatural beings who own the saltwater.

Presently, the water is extracted by means of gasoline pumps, but it continues to be distributed in a controlled way through canals. There is evidence that prior to the use of solar evaporation, the water was boiled in great clay containers, of which there are great amounts dumped in the lateral cuts. Since the space is limited and the saltwater season is in the first half of the year, the workers employ some of the same ponds used for solar evaporation to store the brine for a few months and increase its concentration. Later, this water is distributed to other ponds where it undergoes the solar evaporation process, and in this way full advantage is taken of the available spaces.

Another double use of available space that may be observed at Ocotlán is the placement of the water storage

cistern known as the coscomate into the larger space of an evaporation pond, which itself is surrounded by the entire complex of the saltworks. The saltworks in turn are surrounded by the town, and the latter is finally surrounded by the enclosing local topography. The saltworks in this context are suggestive of a recreation of the pre-Hispanic cosmos as an image of the land surrounded by waters but restructured on a smaller scale in a landscape of 1km². It is a landscape in which the pattern of containment is repeated and progressively reduced from the mountains down to the small cistern or coscomate nested within the evaporation pond. One must remember that the hills were conceived as containers of water in ancient times (Broda 1991: 480; Lopéz and López 2009: 39-66), and the saltworks are also water containers. Similar ideas of the recreation of the cosmos have been previously pointed out in other parts of Mesoamerica, especially among the Maya (Gillespie 2000).

The town of Ocotlán has clear pre-Hispanic antecedents and must have traded and given salt as tribute to other, greater political entities, since in a small plaza one can observe a sculpture which belonged to the ancient ballgame, carved as a solar symbol in the distinct style of the symbols associated with the conquests of the Aztecs.

Other archaeological cases

The use of saltwater in the entire region of the Mixteca shows that the hidden redoubts where it was possible to obtain natural brine, located in zones of uneven topography, made it difficult to develop a water management technology on a large scale. The saltwaters were obtained from springs with low force and amplitude and had to be exploited at short distances and through the construction of storage spaces before they run away into the natural drainage.

On a much smaller scale, mechanisms were used for the decanting and filtration of these saltwaters in pre-Hispanic times, which involved the circulation of water over short distances and through various containers. One documented case in Zapotitlán, Puebla, includes the storage of water in cisterns of more than 200L, from which the water was taken through assembled clay pipes to another container, where it was then decanted to eliminate sediment. Furthermore, this water was passed through a filter of natural fibres and through a small canal until it reached a third cistern, where the clear brine was stored and finally boiled in stoves using small pots (Castellón 2007, 2008). During this entire water management process prolonged exposure to the open air was avoided and care was taken to move the liquid through containers, pipes, and small canals.

Another case observed in Casablanca, Oaxaca and in Chila de la Sal, Puebla, is a version of this same type of filtration but using soil and also clay pipes. A cistern was likewise constructed on the highest part of a natural or artificial elevation, and assembled pipes that led the water to a lower cistern were placed to perform operations of saltwater filtration and to eliminate impurities. These procedures are similar to those that can still be observed in the town of Nexquipayac, in the State of Mexico, where a compacted clay filter with a small drain pipe is used (Parsons 2001: 24-42; 2008).

Conclusions

Technologically, saltwaters at the sites discussed in this article led to the creation of small water control systems, limited in size by the nature of the brine, which in most cases is not very concentrated. The ancient and modern workers of the salt knew the properties of this water and knew that they had to avoid its contamination and mixture with dust and other foreign agents. Exposure to air and rain could diminish the quality of the water and affect salt production; thus, different solutions were tried to protect the water, always aiming to preserve its underground nature until it was able to be turned into crystals. This kept the water from running for distances greater than 2km, which could affect its salinity, and the small canals linking the terraced evaporation ponds were no greater than 20cm wide and 10cm deep was also the maximum depth of the ponds.

In some cases, the conduction of water is accomplished using wood or clay pipes over distances no greater than 100 to 150m, and the pipes themselves have a maximum diameter of 10 to 15cm. Generally, the salt complexes forming an estate operated by one or two saltworkers do not contain more than 20 to 30 ponds though there are examples of estates with nearly 100 ponds that require two or more people working at different times. The surfaces of these complexes currently have an average area of 1400m², not counting the distance to the water sources, which are sometimes more than 50m away. They are located in areas with steep slopes, which establish the limits and possibilities of a water control system focused on salt production.

Throughout this article, I have emphasized the symbolic implications of water management related to salt, mainly those of the agricultural language used. Salt is like a fruit obtained through a process that starts with water. The water is cared for in different containers such as the coscomate, which are the metaphorical womb or pot representing the aquatic underworld from which salt will be born. But this process, constantly recreating the subterranean cosmos of the ancient Mesoamericans, happens in a liminal space, the saltworks, where humans know they are recovering the residue of intangible beings, and that this residue whose materialization is salt, is contaminated by the sins of the old gods. They are dangerous places where beings who can bring death

to humans roam (Castellón 2015: 79-80). One very common case is the woman who appears in these places, sometimes fleshless; she lives in the water sources, and she moves through the air and causes men to die by drowning (Figure 12). She is associated throughout Mexico with rivers, lakes, and bodies of water, and is commonly known as 'La Llorona' (The Weeping Woman), which happens to be in many senses a version of the ancient Aztec goddess Cihuacoatl ('Snake Woman'). This goddess is no doubt related to the attributes of the goddess of saltwaters known by the Aztecs as Huixtocihuatl, who was thrown by the gods of water from their paradise to the most remote regions due to the transgressions and sins that she caused (Sullivan 1982: 23).

Considering the concept of geographic locations and towns as living entities, in ancient Mexico the saltwork sites must have must have had special significance within their cosmology. Habitation and activity sites such as saltworks are animated beings (Gillespie 2000; Lévi-Strauss 1982: 172-174; Vogt 1969: 140-144; 1998). I propose that the saltworks represent the space where the salt goddess was thrown, a site that is saltpetrous and contaminated by sin; a space that must be part of the primordial waters: the sea, but is related also to the other waters in the interior of the sacred mountain where the water gods reside. If we conceive of the saltworks as part of a living being, they are the sites in which sores and discharges, excretions and wastes, are produced by the earth goddesses (Tlazolteotl, Tlaltecuhtli), where garbage, the foetid, the impure, reigns. Saltworks are like wounds of the earth that produce crystals, which upon being consumed, make humans heavy and mortal, that is to say, give the living their quality of vulnerable beings. These places are alive and they are remote, because they are the spaces that the gods do not want to show openly.

The underground saltwaters are conduits that connect the world of humans with the hidden spaces where the wastes of the gods emerge, and they are also connections with the larger underground and aquatic world. But the salty canals and their underground reservoirs are only a part of this great system of waters, with the quality of the salty, and the activities and solutions of its management have also been created as a specialized subsystem of water distribution and control that belongs to the gods of the underworld and vegetation.

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Figure 12. Depiction of the 'Weeping Woman' as a supernatural entity dwelling in the saltworks and some examples of the crosses and altars built close to the salt deposits to protect the saltworkers (Drawing and photos by B. Castellón).

References

Broda, J. 1991. Cosmovisión y observación de la naturaleza: el ejemplo del culto de los cerros en Mesoamérica. In J. Broda, I. Iwaniszewski and L. Maupomé (eds.), *Arqueoastronomía y etnoastronomía en Mesoamérica*: 461-500. México, National Autonomous University of Mexico.

Caran, C. and James A. N. 2006. Hydraulic Engineering in Prehistoric Mexico, *Scientific American* 295, 4: 78-85.

Castellón, H. B. 2007. Antiguos talleres de producción de panes de sal en Zapotitlán, Puebla, México. Problemas para su definición y estudio. In Morére N. M. (ed.), *Las salinas y la sal de interior en la historia: economía, medioambiente y sociedad* 1: 435-465. Madrid, Universidad Rey Juan Carlos.

Castellón, H. B. 2008a. Technologie et enjeux de la production du sel dans les salines préhispaniques de Zapotitlán, Puebla, Mexique. In O. Weller, A. Dufraisse, and P. Pétrequin (eds.), *Sel, eau et fôret. D'hier à aujourd'hui*: 119-142, Homme et environnement, Besançon, Presses Universitaires de Frenche-Comte.

Castellón, H. B. 2008b. Sobre el entorno geográfico y tecnológico de las salinas prehispánicas en víspera de la conquista. In M. García and B. Maldonado (eds.). *El pasado tecnológico, cambio y persistencia*, Zamora, El Colegio de Michoacán (in press).

Castellón, H. B. 2015. El mar y la sal: una relación necesaria con tierra adentro. In F. Trejo and G. Pinzón (eds.), *El Mar: Percepciones, lecturas y contextos*: 55-81. México, Instituto Nacional de Antropología e Historia.

Gillespie Susan D. 2000. Maya nested houses: the ritual construction of place. In R. Joyce and S. Gillespie (eds.), *Beyond kinship: Social and material reproduction in house societies*: 135-160. Philadelphia, University of Pennsylvania Press.

Lévi-Strauss, C. 1982. *The way of the masks*, Seattle, University of Washington Press.

López, A. A. and López L. L. 2009. *Monte sagrado, templo mayor*, México, Instituto Nacional de Antropología e Historia.

Neely, J. A. and Castellón, B. 2003. Avance del estudio contextual de los sistemas de canales prehispánicos 'fosilizados' del Valle de Tehuacán, Puebla, *Arqueología* 29: 157-160.

Neely, J. A. and Castellón, B. 2014. Una síntesis del manejo prehispánico del agua en el Valle de Tehuacán, Puebla, México, *Arqueología* 47: 182-198.

Osorio, V. 1998. Sangre, sudor, mocos y lágrimas: excrecencias humanas que originaron la sal. Ensayo sobre mitología mesoamericana. In J. C. Reyes (ed.) *La Sal en México II*: 373-399. Colima, Gobierno del Estado de Colima,Universidad de Colima, Consejo Nacional para la Cultura y las Artes.

Parsons, J. R. 2001. *The Last Saltmakers of Nexquipayac, Mexico. An archaeological ethnography*. Anthropological Papers, Museum of Anthropology, Ann Arbor, University of Michigan.

Parsons, J. R. 2008. Los últimos salineros de Nexquipayac, Estado de México: El encuentro de un arqueólogo con los vínculos vivos de un pasado prehispánico. In B. Castellón (ed.), *Diario de Campo* Suplemento 51, *Sal y Salinas: Un gusto ancestral*: 69-79. México, Instituto Nacional de Antropología e Historia.

Seele, E. 1973. Galerías filtrantes en el Estado de Puebla, *Comunicaciones* 7: 141-151.

Sullivan, T. D. 1982. Tlazolteotl-Ixcuina: The great spinner and weaver. In E. Hill Boone (ed.) *The art and iconography of Late Post-Classic Central Mexico*: 7-36. Washington, Dumbarton Oaks.

Vogt, E. Z. 1969. *Zinacantan : A Maya community in the highlands of Chiapas*, Cambridge, Harvard University Press.

Vogt, E. Z. 1998. Zinacanteco dedication and termination rituals. In S. Mock (ed). *The sowing and the downing: termination, dedication and transformation in the archaeological and ethnographic record of Mesoamerica*: 21-30. Alburquerque, University of New Mexico.

Salt 'Roads' in Moldavia by the 18th Century: Production, Transportation and Consumption

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Abstract

Though the title uses the term 'roads', the purpose of this paper is not to reconstitute the itineraries of salt in Moldavia during the Middle Ages, but only to outline a possible history of salt east from the Carpathians, as well as three essential phases of its valorisation: production, transportation, and consumption. We do not claim our study to be exhaustive; furthermore, we mention the limits imposed by the various sources of the time (documentaries, narrative, statistic, treasury records or records of eighteenth-century noble courts). In Moldavia, there was an abundance of 'very clean, crystal-clear salt', in the words of the scholar prince Dimitrie Cantemir. This mineral, indispensable for the human diet and livestock breeding, has always been monopolized by the State (in terms of exploitation and outlets), including special taxes and exemptions, granted mostly to monasteries. Whoever failed to prove that the salt used for consumption came from domestic mines had to pay a special tax. Exploited directly by princely administration and subsequently leased, salt mines were managed by dignitaries charged with monitoring production and collecting the incomes (*cămărași de ocnă*). This income was sent either to the State (to the State Treasury), or to the prince (to the princely Treasury); these incomes were strictly accounted for, and special records were used for bookkeeping. In the mid-18th century, some of these incomes were used for paying the wages of several high dignitaries in the country. In their turn, princes made significant donations to the monasteries in the Orthodox East, either in kind, or in cash (from salt incomes). Mineworkers (*şaigăii*) who 'cut the salt' in the mines, were assimilated to craftsmen. Besides their wages, they benefitted from tax exemptions and other financial aids. From the mine, salt was transported as boulders (*drobi*) or crushed salt (*moloz*) in large sacks, in small or large wagons. Salt ended up on the country's roads during fairs. For its trading, merchants had to pay taxes to the princely court. They also sold salt to private households for individual consumption. Concerning household use, there are direct testimonies on salt purchasing and valorising in people's houses. There are also records on its use for cooking or for curing foods for the winter (salt fish, pastrami, sauerkraut, sheep cheese), for which salt was mandatory. Certain records of noble courts (which still exist) provide first-hand information on salt: purchase prices, sources comprising the annual amounts used in a countryside estate, bought from mines, for the estate's kitchens, and for the livestock.

Keywords: Medieval history, Moldavia, rock salt, salt water springs, salt production, guild members, roads, merchants, prices, salt consumption.

Introduction

On one hand, salt is indispensable for the diet of humans and of livestock. On the other hand, salt brought important incomes to those who controlled its production and valorisation through taxation and sale. If we add to these arguments the symbolic aspects ascribed to this mineral, it is not surprising that it represented a major research topic in international historiography. Things are quite different in the Romanian space, where papers dedicated exclusively to salt exploitation in the medieval period are scarce due to several reasons, the most important of which is the precariousness of information sources from those times. Broşteanu (1901) conducted an almost exhaustive research for his time, while more recent historiographic productions belong to Vitcu (1987) and Apetrei (2014); while focusing on salt exploitation in modern Moldavia, the two authors also include consistent references to the medieval period. Other small papers fail to include unpublished sources or to bring a new interpretation, such as the papers written by Ichim (2006) or Dudnicenco (2009).

As far as we are concerned, we will only try to outline the general framework of a future specific research direction on the topic featured in the title of this paper. From a methodological standpoint, we will use the critical method in order to highlight, by systematizing, the essential information reflected by the written sources of the period (official and private documents, State and particular registers, notes on manuscripts and old books, travel journals), edited in special collections. Such information was also comprised in several unpublished sources and in the most significant titles within the secondary bibliography. Our research

is limited to the territory of the former medieval State of Moldavia in the 15th–18th centuries. We have used information dated to the 13th and 14th centuries, as well as to the first decades of the 19th century, meant to help us understand certain aspects of this topic.

We will follow the 'salt road' throughout three essential stages. Thus, in the first and most consistent part, we will study the actual extraction and production points (administrative structures, guilds, production methods). The second part will concern the salt 'journey' per se (roads, means of transportation, fees, merchants, etc). The third part will comprise aspects related to final consumption.

Salt production: places and people

First documentary information

The first reliable data on salt exploitation within this geographic space date to the 13th century, and they concern the northern Black Sea and the Danube mouths. Mostly Venetian and Genovese merchants were actively involved in trading, as they had settled here with the approval of the Tatar khans. Almost a century before the emergence of the Moldavian State, the feudal masters of the regions situated east and south from the Carpathians – mentioned in the few documents of the times as *majores terrae* or *potentes illarum partium* – made commerce with Northern Black Sea merchants. These masters traded luxury merchandise (broadcloth, silk fabrics, spices and jewellery) for local products such as grains, wax, cattle skin and cured meat (pork or beef). Two contracts of 1281 are relevant from this perspective: 'I mention this product, one dated October 7 related to 49 such items'. They also traded their products for salted fish, mostly sturgeon, catfish and carp (Giurescu 1997: 53-56). Obviously, such products must have required locally-produced salt; it came from the salt water lakes of the region or from the Danube and Black Sea harbours, thus extracted from the areas south and east from the Carpathians (Dudnicenco 2009: 206; Vitcu 1987: 25). There is reliable information on contracts made to buy certain amounts of salt and wine, concluded in 1361 at Chilia; the salt purchasers included Lamberto Buscarini, a banker settled in Chilia (Giurescu 1997: 56). We also know that salt was loaded on the ships anchored in the Cetatea Albă (Monocastro) harbour in the 14th century (*Călători* 1968: 16). Thus, 'a ship carrying sea salt from the Northern Black Sea town of Illicis (Lerici), situated east from Odessa, at Chilia, is mentioned in a document drafted up in this town by the Genovese notary Antonia da Ponzò in 1361' (Cihodaru 1984: 124).

Moreover, equipment for extracting sea salt was known as early as the mid-10th century in modern-day Crimea, as shown in a famous contemporary Byzantine work: 'From the Dnieper river to Cherson is 300 miles, and between are marshes and harbours, in which the Chersonites work the salt' (Constantine Porphyrogenitus 1967: 187).

The news on salt obtained or only traded through the outlets of East-European commerce from the Danube and the Black Sea is absent during four centuries, because the south of medieval Moldavia became part of the Ottoman Empire beginning in 1484.

However, one should not believe that the artisanal and commercial activity of the area simply ceased. Later information confirms that this did not occur. In 1783, a traveller to the Sulina area describes the method used by locals to extract sea salt. Thus, in a very long and wide marsh, 'in the months of June and July, excessive heat covers this marsh with a four-finger thick white crust, which locals and inhabitants of faraway regions take off the marsh; they dry it up and use it to obtain sea salt, which they then transport to Constantinople using carts or ships [...]' (*Călători* 2000: 636, 637). Less than a decade later, another traveller who arrived in the south of Bessarabia mentions 'the Tatar Bunar area comprises small salt water lakes, on which surface the sun brings sea salt (*das Sal marinum*). The incomes brought by this salt used to be sent to the Crimean khan, but after the dissolution of the khanate, <they were redirected> to the Ismail pasha' (*Călători* 2001: 874). The witness to these events referred, of course, to the former Tatar State of Crimea having been annexed to the Russian Empire. Other records complete the picture of sea salt production in the area. Parant – the vice-consul of France in Iași – wrote a report on 11 June 1798, where he also adds that in Chilia 'il se fait une bonne quantité de sel blanc'. It was also sent, not long ago, the vice-consul adds, to the Russia of Catherine II, but exportations dropped significantly because of the high taxes imposed by the Saint Petersburg monarch (*Călători* 2001: 1315; Hurmuzaki 1885: 186). Another report of 1810 – this time for the Russian troops occupying Moldavia – shows that the lakes in southern Bessarabia received salt water from the Black Sea; in the dry summer months, natural evaporation leads to salt crystallization. Furthermore, the area was not very populated; hence, the various rulers of the regions could not afford to grant tax exemptions for people specialized in the large-scale exploitation of the salt. Thus, the lakes were leased and the inhabitants of the area and those on the other side of the Dniester could take it, by gathering it into piles beforehand; 60,000 *chile* were produced in 1810, namely 16.4 million *ocale* (Bulat 1938: 126, 127) [1 *ocă* = 4 *litre* = 2.271kg].

Finally, in the late 19th century, a work describing the economic and social realities of the area notes that the lakes in southern Bessarabia 'are rich in salt'; the author highlights Lake Sasâc (or Cunduc: 'they make

salt using this lake'), Lake Şahan (or Murtazi: 'it is the most important salt lake. They obtain great amounts of salt from it') and Lake Alibey-ulu ('important for obtaining salt') (Arbure 1898: 68-69).

The beginnings. However, in the Middle Ages, Moldavia was famous for the rock salt extracted from the mines of the Trotuş area. We agree that Târgu Trotuş was 'the oldest and most powerful administrative centre of organized salt exploitation in Moldavia, from the 14th century to the end of the 17th century, when it was surpassed by Târgu Ocna' (Vitcu 1987: 26). Moreover, in the early 18th century, these two localities 'are worth mentioning only because of their famous salt mines, situated in their vicinity'. Dimitrie Cantemir – the scholar prince of Moldavia –, in a work written as ordered by the Academy of Berlin, also shows that the rich salt deposits of Moldavia, situated very close to the surface, provide 'highly pure, salt, clear or crystal or porphyry, without any trace of soil' (Cantemir 1973: 83). The areas near Trotuş are not the only ones comprising salt mines in Moldavia, but the country's princes – who benefited from the exploitation of this natural resource – prohibited the opening of other mines in order to prevent too much supply, which would lead to lower prices (Cantemir 1973: 103). This fact is confirmed by a report drafted by the country's boyars in 1810 (Bulat 1938: 125).

This extraction area also provides the first mentions of salt exploitation in documents. However, because we stay true to the chronological principle stated in the introduction, we must mention the opinion of certain scholars, who are persuaded that salt had been extracted long before in other places in Moldavia. Based only on oral tradition and on the geologically-proven salt presence in the region, without any documentary record in this respect, the mid-19th century mineralogist Carol Mihalic of Hodocin stated that the first salt exploitations in Moldavia would have occurred at Ocniţa. More precisely, this was in the modern-day northern Republic of Moldavia, in a salt mine subsequently deserted due to the Mongolian invasion of 1241. Such a hypothesis cannot simply be rejected as improbable (Vitcu 1987: 25), which is why we mention it as such. We equally have to note the opinion according that, before Târgu Trotuş, salt would have been extracted from the salt mines nearby, at Grozeşti (Broşteanu 1901: 82; 138; 218-219).

After monopolizing salt exploitation and valorisation in Moldavia, the country's princes made efforts to organize as efficiently as possible the production of a sector that brought them significant incomes. In order to be able to estimate a certain amount of salt extracted and valorised on the domestic and foreign market, the central power was actively involved in the organization and functioning of a miners' guild, and they tried to control the efficient functioning of salt mines. To this end, first they colonized the Trotuş area with experienced miners from Transylvania, without ignoring or minimizing the role of locals in the mine activity (Vitcu 1987: 26). This is actually urban development at its best. In the European Middle Ages, towns always required ethnically heterogeneous population, as it was considered a factor of progress. The Hungarian king Stephen the Saint told his son 'the kingdom is weak and fragile because it has a unique language and only one custom' (Giurescu 1997: 82); thus, he encouraged colonization. The same mindset was present east from the Carpathians, following the foundation of the State in the mid-14th century but also before this event.

In Trotuş, 'in the past, inhabitants were Hungarians', according to the Catholic missionary Marco Bandini, who wrote this around 1646 (Bandini 2006: 126), and there is no reason to disbelieve him. This area was indeed colonized with ethnicities from the Hungarian kingdom, such as Hungarians and Germans (Transylvanian Saxons), as mentioned in two papal letters dated to 1228 and 1234 (Giurescu 1997: 43). Hence, the colonists – mainly Szeklers – first crossed the mountains sometime in the 13th century, mostly following the 1241 Mongolian invasion. Easily exploitable salt deposits represented one of the most important reasons for such movements (Rădvan 2011: 588, 589), which also contributed to the acceleration of urbanization. Even the Romanian term for 'oraş' (town, city) comes from the Hungarian *város* (Ciorănescu 2002: 562). As a direct consequence of this phenomenon, the Trotuş town included 'one of the oldest Hungarian communities east from the Carpathians, or even the oldest according to some, from the first half of the 13th century, related to salt exploitation nearby' (Giurescu 1997: 87, 318). Regarding the meaning of *ocna*: in Romanian, it designates a salt mine and is a lexical loan word from the Old Slavonic *okno* (Ciorănescu 2002: 555), taken over as such by Hungarians, too (Dudnicenco 2009: 206). In exchange, the Romanian language borrowed the Hungarian term *sóvágó*, which led to the Romanian term şalgău (also spelled şangău, şaugău, şavgău), which designated the miner who cut the salt in the mine; in addition, the Hungarian *biro* became *birău* in Romanian (Ciorănescu 2002: 93, 579). We believe that the term *birău* – at least in the 17th century, if we accept a semantic evolution of the term – designated the leader of the şalgăi guild, who represented them when necessary and who judged cases between them instead of the administrative ruler of the town, either (Târgu) Trotuş or (Târgu) Ocna, as stated sometimes. A document dated June 1, 1635 – issued at Trotuş in an estate-related matter – mentions a salt mine *birău*, Ioniţă (Ionaşcu) Căpăţână, as well as Condre şoltuzul (*DRH* 1996: 155, 162), which at that time designated the head of urban administration (the 'mayor').

The neighbouring Transylvania was a suitable place to find salt-cutting specialized miners because, as part of the Hungarian kingdom, in the 14th century it acquired experience in the organization of salt mines production and administration. In the second half of the 14th century, salt was extracted at Ocna Dejului. The administration included a *comite* (county administrator) of princely salt stores and salt mines (*comitis camerarum et salifodinarum regalium*) and a *vice-comite* (deputy county administrator) of salt mines (*vicecomes salisfodinarum*) (*DRH* 1994: 134, 135, 439). The Romanian inhabitants within the counties of the Transylvanian voivodate had the duty of transporting salt within groups of four or to pay someone else to do it (*DRH* 1994: 296).

Administrative structures. Once this experience was 'transferred' east from the Carpathians, it brought consistent incomes to the princely *cămara* (treasury), which overlapped the State treasury in that period. Salt production – organized by the central power – was limited to the salt mines near Târgu Trotuş. The first mention in documents of Trotuş – as centre of the county with the same name – concerns a commercial privilege granted to the Lviv merchants in 1408, and Trotuş is listed as customs point. In 1435, the prince already had here princely judges who monitored all affairs, including the freedom of commerce (*DRH* 1975: 196). In the same year, salt was mentioned for the first time in a domestic document: on 23 February 1453, a monastery near Suceava – the main residence of the country's princes – received the right of founding a village with 'foreign' people (again, colonists) who were granted tax exemptions and other kinds of exemptions, including the right of free commerce of salt (*DRH* 1976: 39). On 30 September of the same year, another monastery was granted a duty-free pass for three merchandise carts, including salt 'at all salt mines' (*DRH* 1976: 52). This ambiguous phrasing seems to suggest the existence of several mining exploitations, thus an initial stage at least in the organization of the princely monopole of salt exploitation at Trotuş and in the prohibition of other mines. Over time, the documented mentions became more numerous, but not necessarily more clarifying. Probably the first mention of Trotuş related to salt exploitation in nearby mines is the one of 1467, when the Hungarian king Matthias Corvinus attacked Moldavia through Oituz and then headed towards the north to Trotuş, 'where the salt mine is situated' (Rădvan 2011: 587). The clear mention in documents that salt is a princely monopole and that it is extracted at Trotuş is actually late: on 17 November 1502, the monastery of Putna is given annually 150 salt boulders 'from our mine at Trotuş' (*DRH* 1980: 505).

Gradually, throughout the 17th century, the representatives of the central power in charge of monitoring the activity of salt mines – whom we will analyze later – shifted from Târgu Trotuş towards the west, at Târgu Ocna; however, this process surprisingly is not featured in any document. This process began and seemingly ended in the late 17th century (Vitcu 1987: 33). Around the middle of the century, in 1646-1648, the aforementioned Marco Bandini provided a detailed description of the Trotuş salt mines situated west from the town (Bandini 2006: 126). The town was still alive, but a series of factors – including the turbulent context of warfare that brought armies and robberies to the valley of Trotuş and that are still topics of debate for historians– contributed to the fall of the town. Around the mid-17th century, in a tense political context, a throne claimer tried to obtain military assistance from neighbouring Transylvania. However, the troops that crossed the mountains through Oituz had to face the şalgăi (miners) of Ocna; advised by one of them, they laid flat on the ground to avoid the first canon strikes of the invaders' armies and then they stood up and 'the şavgăi attacked them with scythes and axes with long handles' (Costin 1958: 147-148). Following is another example, among many others: in 1686, the invasion of Polish troops also affected the mines area; they robbed and killed people, among whom was a certain Enache the mine *grămătic* (secretary) (Neculce 1982: 310-311). In 1712, a foreign traveller to these realms mentions Târgu Ocna first. Salt, 'extracted here with minimum effort, is transported across the country and in the neighbouring countries'. Thus, the town thrived while, at small distance, Târgu Trotuş was 'completely ruined' (*Călători* 1983: 346). At the end of the century, an Austrian officer considered Trotuş a simple village, unrelated to salt exploitation (Donat and Papacostea 2015: 292). In 1820, it was connected to salt extraction only because its inhabitants also included 78 workers (*lăturaşi*) in the mine situated near the neighbouring town of Târgu Ocna. These workers comprised four mine masters, seven guards (*străjeri*), as well as the seven widows of former workers (Ciubotaru *et al.* 2013: 405-406).

Such an important activity for the country's budget was definitely monitored carefully: they noted the amounts of extracted salt, the expenses and incomes, following the model of similar statistical documents preserved to this day. The first mentions of such registers – called *sămi* in the terminology of the time – concern two documents drafted in the princely chancellery on 5 and 11 September 1596, which also include the phrase 'a *samă* from the mines' (*DRH* 2014b: 271, 275, 329). Two centuries later, in June 1806, a treasury *diac* (clerk) was sent to 'the Mine to bring the salt register' (Caproşu 2011: 47). In 1823, there already existed fragments of mine registers, comprising detailed calculations of the incomes made from selling (at the stores of Sculeni, Leova and Lipcani, namely to the left and to the right of Pruth) and the production expenses, including salaries and customs charges (Furnică 1931: 284-294).

All these documents were carefully monitored by the prince, who proposed measures for the improvement of this activity. One was to prohibit salt exploitation independently and to lease the salt mines for various periods. The leasing – the preferred method in the 18th century – began by auctioning the income of the mines. The treasury then offered a contract for 1-3 years – approved by the prince – stating that the leaseholders had to pay the mineworkers and the various donations made by the prince to third parties (Vitcu 1987: 30, 31). In troubled times with uncertain reigns, things could turn sour for the prince and for one of his primary financing sources. In a case judged in 1730, Mihai Racoviță (former Moldavian prince) complained that Ilie Cantacuzino – high *vistiernic* (treasurer) – had bought from the prince the income of a mine for a year for 12 bags of coins, but that after five months the prince left the throne without having received a dime from the leaseholder (Istrati 2008a: 551). For the financial year of December 1806 – December 1807, the income of the mine was bought by the *logofăt* (chancellor) Costandin Balş and the *hatman* (high spatharus) Sandu Sturza for a total amount of 294,666 *lei* and 80 *bani* (Caproşu 2011: 112) [1 *leu* = 120 *bani* = 40 *parale*]), meaning 24,555 *lei* per month. After the Russo-Turkish war of 1806-1812, the same income of mines for the months of October 1813 – May 1814 was bought by an association between the *comis* Panait Cazimir, the *comis* Enăcache Pruncul and the aforementioned Sandu Sturza (who had become high *vistiernic*) for 114,166 *lei* and 80 *bani* (Caproşu 2011: 252). This accounts for 14,270 *lei* per month, thus a much smaller amount.

Any calculations concerning the income brought by mines and its weighting in the general budget of the State are bound to be relative, because there are no complete data or long-term information on the matter, the reason for which no comparisons can be made. In the 18th century, princes required strict bookkeeping records concerning the budget, comprised in the so-called *sămi de vistierie*, which were actually registers that included State incomes and expenses. In the financial year 1792 (a year of war), the money brought to the State budget by customs and mines – 8,166 *lei* and 80 *bani* – represented a rather small percentage of the entire amount within the *sama vistieriei* of that year, namely 536,769 *lei* and 92 *bani* (approximately 1.5%, if our calculations are correct) (Caproşu 2010b: 228). When things calmed down and salt production resumed a normal rhythm, salt mines brought significant incomes to State budget. Only in October and November 1805, the mine produced 33,333 *lei* and 40 *bani*, without counting the 2,222 *lei* which the former prince Scarlat Calimah took with him when he abandoned the country's throne in the autumn of the same year (Caproşu 2011: 83, 89).

The princely representative in all matters concerning salt mines was the *cămăraşul de ocnă* (mine administrator), who lived in the town that managed the mines area; such administrators were mentioned in documents rather late, towards mid-16th century. Their main task was to monitor salt exploitation process and its distribution domestically or abroad.

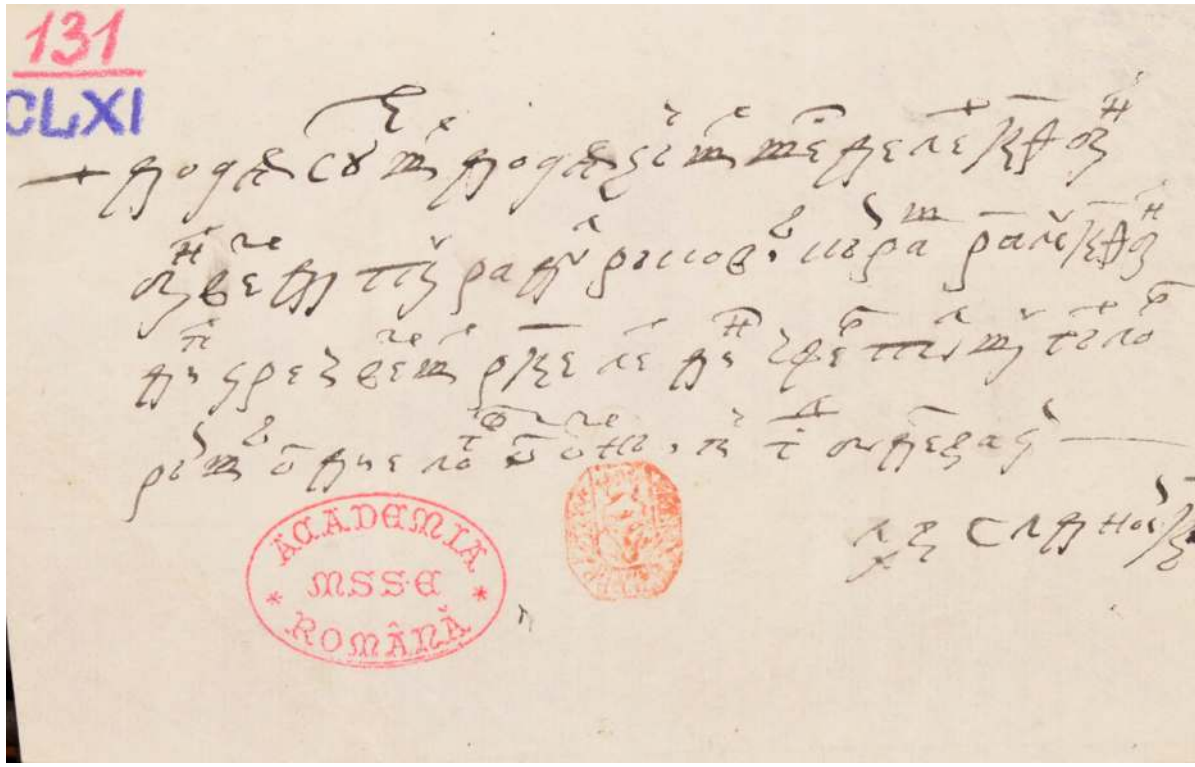


Figure 1. Princely receipt for an amount of money from Târgu Ocna (28 November 1725) (BAR CLXI/131).

The *cămărași* investigated and judged cases within their jurisdiction – represented by the town – and they solved the matters brought before them by guild members; such matters included financial debts and patrimonial conflicts, to name only two of them (Istrati 2008a: 36, 129; Vitcu 1987: 30). They managed all money made from selling salt or from the tax paid by șalgăi. For all amounts arriving to the treasury, they received a receipt from the prince, such as the one of 28 November 1725, bearing the prince's seal (Figure 1).

They were also responsible for the princely donations: they made sure that such donations – like amounts of salt or equivalent money – reached their destinations. A princely donation to the Monastery of Lavra on Mount Athos – dated 23 October 1735 – mentions that the annual amount of money for the monks on Mount Athos will be taken from the princely income (the princely *cămară*) when the mine functioned în credință (independently) and provided by the mine administrators when the mine was leased (Istrati 2008a: 714, 724). In 1741, the high mine administrator Costantin Paladi was ordered to give to the representatives of a Romanian church near Brașov an amount of money from the mine incomes, which accounted for a previous princely donation dated 2 September 1733 (Istrati 2008a: 87, 522).

Because Târgu Ocna was situated near the west border, the attributions of mine administrators were more diverse. On 23 March 1742, one of them received an order to buy from the Hungarian Country 10 spears used in the *halca* game (Istrati 2008b: 256), consisting of throwing a spear through a metallic ring. In other cases, because they had acquired this position based on older loyalties to the prince, the mine administrators received secret missions. For instance, they had to monitor certain people who for various reasons had become a nuisance to the Iași-based princes. Hence, in late 17th century, Ion Buhuș the mine administrator – a cousin of Prince Constantin Duca – sent a Greek from France to the jail of Trotuș. This Greek knew how to secretly open correspondence and this innocent skill led him to become aware of many princely secrets. Finally, when he left the throne, the prince ordered the killing of the dangerous witness; his command was fulfilled by strangulation (Neculce 1982: 358-361).

This function brought significant incomes to the holder. A certain mine administrator Căzan had the financial power of ordering a copy of a *Tetraevanghel*, to be completed by 2 July 1552 (Caproșu and Chiaburu 2008a: 67); it must have cost several dozen gold coins. However, this position also entailed risks. At the beginning of the fifth decade of the 16th century, the mine administrator Ieremia lost a village in favour of Prince Petru Rareș, to account for a debt of 3000 *aspri* 'from salt mines'; he even lost his function, because a document of 1541 mentioning this loss states Ieremia as former mine administrator (Isac 1989: 259). Such money was a temptation for many people, mostly during troubled times like periods of war. A document dated 1 May 1662 states that, not long before, a certain Vasilie Gealalăul – who had been appointed mine administrator – took advantage of his function and of an army invasion to steal some of the princely money; he was later caught and executed, and his assets were seized for damages (Caproșu 2000a: 22, 74, 77). Early in the 18th century, namely on 2 September 1702, the prince judged a matter between two former mine leasers; because they did not have the money to pay for the first *cifert* (tax) for guild members, they pawned their own jewellery to obtain the necessary money (Caproșu 2000b: 177).

Among other benefits, in the second half of the 18th century, the mine administrator had the right to benefit from the service of certain people (*liudi)*, for which he was exempted from any taxes or fees. In 1776, Iordache Panaite – holder of this function – was registered in the *vistierie* with two tax-exempted persons, while in 1786, the mine administrator Iacovache Păun with three *scutelnici* (tax-exempted peasants) (Caproșu 2010a: 461, 473; Caproșu 2010b: 14, 27, 84, 97, 110).

At a certain point, secondary mine administrators are mentioned, too; they were appointed to help the holders accomplish all of their tasks. In January 1761, the secondary mine administrator Costandin bought and gave away an *Evanghelie* to the Târgu Ocna Church, to have him mentioned in prayers and to have his sins forgiven (Caproșu and Chiaburu 2008b: 106). In 1786, Iacovache Păun had Iftimi Ouatul as his second; the latter also benefited from this function, including the right of having three tax-exempted people under his supervision (Caproșu 2010b: 170, 183). For the spring of 1795, sources mention a third *vistiernic* for a mine (Caproșu 2010b: 311). The staff also included other literates: it was mandatory to read and write in order to obtain this job. This was also the case for the *grămătic*, who had to fill out the registers. A victim of the 1686 Polish invasion was also a certain Enache, mine *grămătic* (Neculce 1982: 310-311). The same clerk attributions were performed by the mine *logofăt* (chancellor) mentioned in an official document dated 28 November 1725 (BAR CLXI/131).

Mineworkers and other guild members. The actual work in mines and outside them was monitored by the prince's people but performed by guild members. If we accept as possible the hypothesis that the first people who exploited salt in the Trotuș area were the *ocolași de Trotuș* (Broșteanu 1901: 84, 216), the most consistent information concerns the mineworkers brought from the neighbouring Transylvania, namely experienced Hungarian salt exploitation workers. These specialized mineworkers organized within a professional and

financial guild were generically called şalgăi in the 16th–17th centuries; initially, the term designated the people who extracted salt boulders, but later it named only the mineworkers per se, who actually cut salt in mines. Along with şalgăi, mines included other socialized workers: *lăturaşi* (they cleaned the insides of mines from fine salt and infiltrated water; brought wood for fire and for mine mouths; and dug out the upper layers of mine mouths down to the salt massif); *curteni* (they maintained contact with central administration and summoned to work the inhabitants who had to work as part of their feudal obligations); *tărăbunţaşi* (they made sure that the *crivac* – equipment used for transporting salt boulders to the mine mouths – worked well); *vătafi* or *vătăjei* (they took care of *crivac* horses). The mine also included other 'professional' categories: the *gurari* who worked at the mine mouth; the *glodaşi* and the repairmen hired for various repair works. The *curteni* who worked in the mine supervised by their *vătăman* also had to guard the border area (Istrati 2008a: 194).

The miners (şalgăi) worked throughout the entire year, except for Sundays and 12 important religious holidays, which in the 17–18th centuries accounted for approximately 300 workdays per year (Apetrei 2014: 63). They were paid an amount of money for each salt boulder (*drob*) cut from the mine and brought to surface; they were also granted tax exemptions for various products, such as for *desetină* (beehive tax) or for *goştină* (sheep tax) (Caproşu 2004: 496; Codrescu 1889: 160-162). For instance, in the period 1763–1764, the mine şalgăi were granted tax exemptions for 1050 beehives and for 5600 sheep (Caproşu 2010a: 70, 141). Furthermore, their guild had the monopoly of meat, bread and wine commerce in the central town of the county (Codrescu 1889: 175, 176). In the 17th century, a traveller noted that at the end of the year, when the mine administrator changes, each şalgău receives 1-3 carts full of salt (Bandini 2006: 130), which seems an exaggeration, though.

Concerning the *bir* (fee), namely the personal tax paid to the State, an evolution in time is worth highlighting. While in 1591 guild members paid this tax partially, in the period 1646–1648 they were completely exempted from it. The tax status change occurred in the first half of the 17th century, after the princely *cămară* became separated from the *vistierie* (Apetrei 2014: 65); this measure was meant to make mine activity more efficient. However, things changed dramatically in the 18th century: on 1 December 1741, the guild was forced to pay the tax entirely (the tax was called *cifert*), but members were exempted from any other fees related to work repartition and obligations (Codrescu 1889: 158; Istrati 2008b: 136). Furthermore, the şalgăi were paid a *ban* for each boulder in the second half of the 17th century or the beginning of the subsequent century (Apetrei 2014: 66; Istrati 2008a: 639, 640). On 1 June 1741, the salary of şalgăi rose from one *ban* per salt boulder to three *bani*, because 'their job was harder than other jobs' (Codrescu 1889: 156, 157, 159, 163); moreover, on 5 February 1783, the salary rose to four *bani* per salt boulder (Codrescu 1889: 174).

The evolution of this activity is very interesting, at least in terms of increasing numbers of mineworkers and successive salary raises. While on 20 February 1591, a register comprising all tax-paying social categories in the country of Trotuş mentions 120 şalgăi (*DRH* 2014a: 545). In 1761, there were 225 guild members with personalized documents (Codrescu 1889: 169) stating tax exemptions and privileges; their number was the same on 2 August 1765. The last document mentions that tax exemptions also applied to injured or 'retired' şalgăi and to their widows. The number of mineworkers had to remain constant: hence, people who were unable to work were replaced by their married sons or by other people 'without commitments' who lived in Târgu Ocna (Codrescu 1889: 170, 171). The census organized by the occupying Russian authorities in 1774 registered 526 houses within the Ocna town; 225 people worked in mines and 131 were şalgăi (*MEF* 1975: 329-334). The efficiency of salt mines was also reflected in the increasing number of mineworkers, which reached 508 (in total) in 1803 (Istrati 2010: 97) and 511 tax-exempted persons in 181. Ninety of them were şalgăi (who actually cut the salt), who also received a salary (paid by authorities or leaseholders) consisting of 5 *parale* per boulder of 75 *ocale*, and half per boulder of 35 *ocale*. In addition to the mineworkers, there were 80 *curteni* in Târgu Ocna (who worked without pay; they counted 20 people per week), 198 *lăturaşi* (in four 'teams': they clear the mine from fine salt; carry the boulders to the mine mouth; bring wood for mine mouths and firewood; they dig the mine mouths or the pits down to the salt deposit; they take the water out of the mine), 15 *trâmbiţaşi* (they guard the *crivac* ropes at the mine mouth and unload the boulders outside), 8 *vătăjei* (they lead the *crivac* horses), 8 *herghelegii* guarding the horses, 16 salt guards, and 16 repairmen (who repaired carts and wagons) (Bulat 1938: 123, 124). The number of şalgăi increased spectacularly to 300 in 1814, when 'the weaker' of them were paid 15 new *bani* per boulder, while 'tougher' şalgăi received 12 *bani* per boulder for the salt boulders 'meeting the standard weight criteria', which meant 78 for each control, while for heavier boulders they received 20 *bani* (Codrescu 1889: 181, 182). In 1820, the guilds of mineworkers who worked near Târgu Ocna counted 151 şalgăi (134 salt cutters and 17 widows), 258 *lăturaşi* (auxiliary workers) who lived in town or in nearby villages (repairmen and guards), along with the widows of their guild, 153 *curteni* or *străjeri*, 18 *herghelegii*, 16 *tărăbunţaşi*, four *burdujări* (they made the equipment used for taking water out of the mines), three *câlţări* (*câlţari*), three leather workers,

two *trăistari* (who made bags) and two *feștelari* (usually Gypsies, who made candles for visibility in the mines). A mine *gramatic* was the bookkeeper, while the 32 tax-exempted people were the 'broken' ones, namely the ill and the crippled for which the prince ordered health assistance as early as the 18th century (Ciubotaru *et al.* 2013: 401-418, 420, 476). Finally, it is worth noting that in 1834 the mines counted no less than 682 guild members (Codrescu 1889: 188).

Besides the aforementioned free people, the salt mines of Moldavia also had Gypsy slaves who worked there as penalty for various offences against the law. The Gypsy slaves carried salt from the mine mouth to the stores (*mâgle*) nearby, and they loaded the wagons arriving from across the country. These Gypsies also included blacksmiths, who were paid 8 *lei* per month in 1810 (Bulat 1938: 123). Certain information seems to confirm that sometimes Gypsy owners 'rented' them for mine work, such as a certain shoemaker Dumitraşcu, who lived in the 18th century. Subsequently sold to another master, the mine administrator is ordered to give the Gypsy to the other master (Istrati 2008a: 68). Mines also include Gypsies owned by the prince, submitted to a mine judge for Gypsies. Following several complaints made by mine administrators, on 2 December 1797, the prince ordered such a judge to look for runaway Gypsies throughout the country and to bring them back (BAR CLXII/229a).

The mines also comprised various felons who had to work there as penalty, as underscored by a foreign traveller to these regions in the first half of the 17th century: 'When somebody commits an infraction not punishable by death, he is sent for three years or for life to a small town where he has to work in salt extraction' (*Călători* 1973: 81). Such 'infractions' are as diverse as one may imagine. Hence, the mines received: robbers (Costin 1958: 134; Istrati 2008a: 24); abbots who stole from church donations (Caproşu 2000b: 140); princely dignitaries who failed to accomplish the orders of the central power (Istrati 2008a: 139, 155, 156, 158, 173, 233, 269; Istrati 2008b: 160); small Jewish merchants of Iaşi (Istrati 2008a: 159); women who got involved with Turks, which was totally forbidden at the time (Istrati 2008a: 192); and merchants who deceived their business partners (Caproşu 2001b: 371). Felons also included accomplices of robbers and murderers (Caproşu 2006: 25), 'to remain there until ordered otherwise', which meant indefinitely (Caproşu 2006: 201, 202; Caproşu 2007b: 242, 326). The mine was also a threat for those who refused to accomplish their feudal tasks by working or for the *apari* ('firemen') of Iaşi who failed to do their job promptly (Caproşu 2001b: 67, 181). Life in mines was, for instance, the penalty for a murderer who had committed the act while drunk and in a bar; hence, he escaped death penalty ('he should remain under supervision and he should cut salt for as long as he lives') (Caproşu 2007b: 282). In the second half of the 17th century, an Ottoman traveller to these regions – who accompanied the sultan's troops – participated to the liberation of around 200 Muslim prisoners who worked in the salt mines of Târgu Ocna, described as huge pits 'resembling hell' (*Călători* 1976: 463).

The felons and Gypsies within mines received religious assistance throughout their life and on their dying bed from the priests of the princely church in Târgu Ocna, for which the priest received 7000 *ocale* of salt in 1793 (Codrescu 1889: 178, 179). Towards the end of the period studied here, hence around 1830, Târgu Ocna comprised two mines: in one of them the Moldavian şalgăi and the Gypsies extracted salt; in the other, which was deeper, felons were charged with extracting salt (Furnică 1931: 335; Vitcu 1987: 48).

Rock salt: mining methods and quantities. There are only scarce records from the time concerning actual salt exploitation at Târgu Ocna. The earliest ones belong to foreign travellers. One of them shows that, in the 17th century, the mine depth was 100 *orgii* [1 *orgie* = 6 feet = 1 *stânjen*]. Outside, there were huge piles of salt boulders ('much saltier than sea salt'), surrounded by 'carts and people moving incessantly, like ants' (Bandini 2006: 130). Another traveller who wrote around 1641 provides information that is more consistent: salt 'is cut underground into large and thick cube-shaped chunks, and then taken out using horse-drawn wheels'; in the mine, the gallery walls were doubled by wood (*Călători* 1973: 248, 249). The normal production rhythm was often interrupted by numerous wars carried out on the Moldavian territory in the 18th century. Repairmen based in Bacău were brought to the mines on 8 February 1742 (Istrati 2008b: 199, 200). In 1788, during the war, a traveller found the Târgu Ocna mines destroyed for the most part, pits collapsed or flooded; the Austrian troops of occupation had renovated three mine pits and leased them to certain Greeks; these pits were subordinated to the salt administration of Galicia (*Călători* 2001: 840). In the last quarter of the century, the salt mines of Târgu Ocna – three in early 18th century, because a document dated 2 September 1702 mentions the 'mine in the middle' (Caproşu 2000b: 177) – were used to extract up to 100,000 salt boulders, each weighing around 100 *ocale* (*Călători* 2000: 248). However, these are just estimates made by people who were far from experts in the field and who had, at least sometimes, an interest in distorting facts. The first reliable figures date to 1811, when the country's boyars draft up a report for the Russian authorities who occupied the country at that time. This report states that Moldavia had recently provided around 17-18,000,000 *ocale* of salt per year, in a year without interruptions. In a previous year, around 20,000,000 *ocale* had been produced, but the şalgăi had been paid more. The production costs – estimated to around 130,000 *lei* per year – were considered high.

Figure 2. Mineworkers' tools (Dudnicenco 2009: 210).

Actually, profit was obtained mainly from exports (Bulat 1938: 124, 125).

However, a recent work dedicated to salt extraction in Moldavia (Apetrei 2014) shows that one can trace the production module of the 16th–18th centuries using the realities of the 19th century. This is possible starting from the observation that sources regarding salt exploitation in Moldavia 'suggest certain constants of the extractive activity'. Actually, this economic sector was rather conservative in terms of the 'technical specifics of the activity'. Thus, salt exploitation began by digging a hole of about two meters in the layer of ground and by strengthening its walls using bound twigs or wooden strips. Inside the obtained pit, the şalgăi cut the salt using hammers (axes) with long handles; salt rocks were taken off using shim stocks entering the grooves made (Figure 2).

Salt rocks were transported to the surface using a device called a *crivac*, endowed with a cylindrical drum with a wooden vertical axis actuated by horses. The pit was protected against water infiltrations from the outside using buffalo skins (Dudnicenco 2009: 209, 210; Furnică 1908: 249; Vitcu 1987: 29) (Figure 3).

The emblematic tools of şalgăi – also mentioned in 17th-century chronicles ('their axes with long handles' – Costin 1958: 148) – are featured on the seals of the two localities where the prince had a salt extraction monopoly during the Middle Ages. The seal of Târgu Trotuş comprised a dexter hand holding an axe for salt extraction (Figure 4).

Târgu Ocna had two seals: the first of them used since 1692 features a şalgău holding a hammer in each hand (Iorga 1906: 281). In the 18th century, the seal added two other figures, flanking the first: a şalgău holding a ladder and another one cutting the boulders (Figure 5).

The salt taken out of the mine was deposited nearby, in stores called *mâglă* or *chelărie* (Caproşu 2006: 548). Each boulder bore the particular sign of the şalgău who had cut it in the salt mine; this was mandatory to ensure that workers were paid correctly. In late 19th century, during a journey to the salt mines of Târgu Ocna, a folklore specialist noted that mineworkers marked their salt rocks with symbols transmitted from father to son; eventually, none of the users was able to explain their potential original meaning (Burada 1885: 174) (Figure 6).

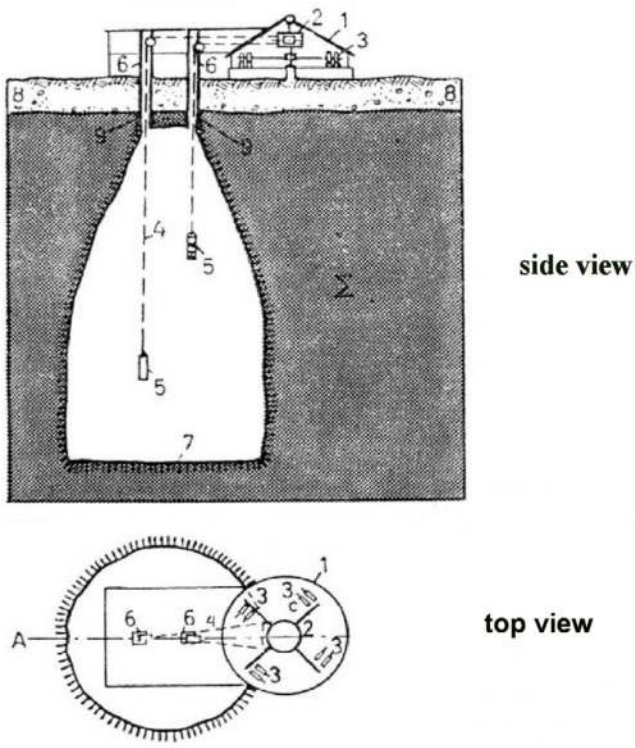


*Figure 3. Device to transport the salt to the surface (*crivac*). 1. equipment manufacturing; 2. cylindrical drum; 3. horses; 4. hemp rope; 5. extraction containers; 6. extraction holes; 7. pit level; 8. ground level; 9. buffalo skins (insulation against infiltrations); Σ – salt deposit (Dudnicenco 2009: 210).*

Starting from a few constants of the extractive process, Apetrei manages to provide in his study (2014) reliable figures for certain elements related to salt exploitation. 'In 1828, when salt exploitation administration was resumed by the Treasury, the şalgăi had a daily workload quota of seven boulders per healthy worker'. Thus, the first conclusion is that 'the miner's workload quota remained relatively unchanged throughout the 17th–19th centuries, namely 39-40 salt boulders per week, accounting for 6.5 boulders per day'. The weight of boulders did not change significantly throughout the 16th–18th centuries; these parallelepiped pieces weighed 75 *ocale* (= around 97kg) on average (Apetrei 2014: 57-59). Using a calculation formula where 'annual production = no. of şavgăi x 6.5 boulders per day x 300 days/ year x 75 *ocale*/boulder', the author obtains certain figures for salt production in medieval Moldavia, which he considers minimal and that can be largely accepted as illustrating reality (Figure 7).

Figure 4. The seal of Târgu Trotuş (the end of the 17th century) (BAR XXXV/69).

Figure 5. The seal of Târgu Ocna (13 April 1732) (BAR LXIV/16).

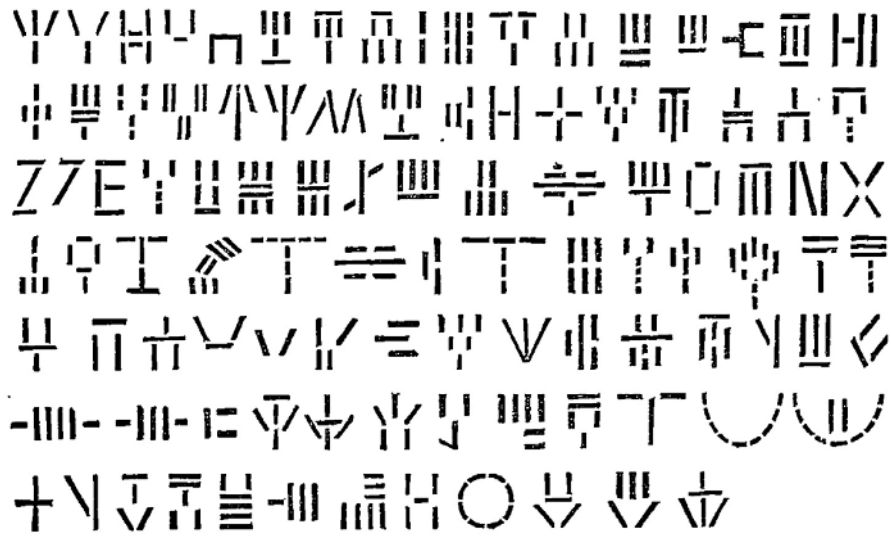


Figure 6. Personalised mineworkers' marks on the salt boulders (Burada 1885: 174).

No.	Chronological reference	Number of guild members (*breslaşi/rufetaşi*)	Number of mineworkers (*şalgăi*)	Number of extracted salt boulders	Quantity (measured in *ocale*)
1	1591– *ante* 1631	120	*c.* 60	*c.* 117,000	*c.* 8,775,000
2	1646–1648	max. 300	max. 150	max. 292,500	max. 21,937,500
3	*c.* 1680–1700	min. 300	min. 150	min. 292,500	min. 21,937,500
4	1761–1796	225	*c.* 110	*c.* 214,500	*c.* 16,087,500
5	1801–1803	508	90	192,420	*c.* 14,431,500
6	1810	511	90	min. 226,666	min. 17,000,000

Figure 7. Salt production in Moldavia (17th–18th centuries) (Apetrei 2014: 76).

However, things are highly relative when it comes to the actual amount of salt extracted, expressed in the measurement units of the time. Besides boulders, they also extracted *steţii* (rather large boulders – Vitcu 1987: 38), weighing around 35 *ocale* each. A princely donation to a monastery in Iaşi, dated 1 May 1738, states that it consists of '100 large *steţii*' (Caproşu 2001a: 1243). Sources indicate a third measure of reference: the *brac* or *coteţ* (small boulder – Vitcu 1987: 38), resulting after an accidental separation of the extracted boulders (Apetrei 2014: 59). We also have to mention the *cumpănă*: on 12 June 1741, a monastery received the right to take from the mine '40 *cumpene* of salt' (Istrati 2008a: 656). This measurement unit becomes clearer by studying two documents of 1780 and 1782, respectively, where two monasteries are noted as receiving princely donations and tax exemptions; these documents state that a *cumpănă* of salt weighed 20 *ocale* (Bulat 1939: 62, 63, 66, 68, 70). However, we do not know the exact amount represented by the 150 *stânjeni* of salt from Ocna, donated on 8 June 1733, by the prince to the Holy Sepulchre in Jerusalem (Caproşu 2001a: 124). To end the list of measurement units, we also note the mention made on 28 September 1767 and in April 1770, regarding the salt 'bucket' (Caproşu 2004: 714, 762). Documents do not usually mention the standard amounts of salt they use as a baseline: on 31 October 1741, the prince ordered a certain amount of salt to be delivered to Iaşi, namely 300 boulders, each weighing 30 *ocale* (Istrati 2008b: 126).

However, rock salt was not found only in the salt mines on the Trotuş valley. In order to trace it, one must travel to other places in medieval Moldavia. It appears that in the 17th century, there was a saline deposit near Hârlău, exploited for the benefit of several nearby villages (Vitcu 1987: 27). Rock salt was also found at Ibăneşti, in the Dorohoi County; in 1652, a visitor of those places saw a 'mine of rock salt called 'Lot's woman''; to transport it, they cut it into pieces of two or three squared feet'. When ground up, 'it is by far the best I have ever tasted, in terms of purity and the smoothness of its refinement and whiteness, as well as its taste' (*Călători* 1973: 495). In 1787, salt was also extracted from a village near Târgu Ocna, called Viişoare (Caproşu 2006: 548).

The most accessible rock salt sources to exploit outside the Trotuş region were situated in Putna County. Around the year 1712, a traveller accompanying a military expedition to the southern Moldavian border, in the Vrancea region, observes as follows: 'This region also comprises salt massifs, and when a villager needs salt, he goes behind his house, to the mountain, he scratches the rock and he cuts off using the axe as much salt as he wants'. However, villagers were not allowed to sell it, but only to use it for an annual fee of 10 *parale* (*Călători* 1983: 324, 345). Local salt also attracted 'consumers', but they were not willing to pay for it. In 1820, three of the local *plăieşi* (local police and border police officers) were removed from the list of taxpayers because they had been 'stabbed to death by the Hungarians who came to steal salt', probably salt found in Valea Sării (Ciubotaru and Dănilă 2014: XXIII-XXIV, 424). This salt was monitored by authorities as early as 1809; they knew it was located 4-6 *stânjeni* deep (around 8-12m). Another place with salt was Poduri, near Valea Sării (Bulat 1938: 126). The salt of Vrancea – also called 'fine salt' (Caproşu 2005: 264) – had exploitation restrictions; only for personal use and livestock diet, but selling and mine opening were prohibited (Bulat 1938: 125). On 23 November 1742, rumour had it in Iaşi that the inhabitants of that county took salt boulders from the deposits in the area, not only for personal use, but also for sale. The Putna abbot was ordered to stop this habit, because the Vrancea inhabitants had the right to use local salt only by brine exploitation (Istrati 2008b: 35).

We know that salt extracted using various methods in other regions than the princely mines of Târgu Trotuş and later of Târgu Ocna could be used by the Moldavian inhabitants for a consumption tax named *solărit* or *solărie*, collected by mine *cămăraşi* through servants called *solari* (*CDM* 1968: 465; Istrati 2008a: 734). The prince could grant *solărit* exemptions, as shown in the document issued following a complaint of the Bistriţa Monastery dated 7 May 1632. The princely clerks in the Neamţ county collected the *solărit* from people within two villages ruled by the monastery; the prince intervened and demanded this abuse to stop, 'for they buy salt from mines' (*DRH* 1971: 66, 67). On 24 April 1718, Mihai Racoviţă abolished this tax for the Suceava county, because he had concluded that the income was leased by the mine *cămăraşi* to middlemen, who abused their function in order to recover the amounts they had invested (Balan 2005: 228-229). On 18 July 1723, the representatives of Vrancea's inhabitants complained to the prince that the amount they had been paying for a long time as *solărit*, namely 35 *bani* per household, had not been respected in the recent period; they demanded to pay as much as they used to and they obtained what they wanted (Istrati 2008a: 702). Thanks to his prerogatives, the country's prince could grant tax exemptions for salt use from other sources than princely mines. Such an example is the village of Toporouţii (Cernăuţi County) belonging to the Barnovschi Monastery in Iaşi, in the 17th–18th centuries (Caproşu 2000a: 14; Balan 2005: 159-161, 211, 214-19, 222, 250; Balan 2006: 20, 30, 35; Caproşu and Zahariuc 1999: 244, 446). Similarly, four villages ruled by the Galata Monastery in Iaşi were exempted from all taxes, the *solărit* included (Istrati 2008a: 524). All amounts collected from the *solărit* were noted in special registers, such as the one ordered to the Cernăuţi abbot on 23 November 1742 (Istrati 2008b: 35); the money represented the income of the high *logofăt*, as written on 13 March 1742 (Istrati 2008b: 241).

Salt springs. Salt could also be obtained from the rich salt-water sources within the Subcarpathian area of Moldavia; actually, they have been used to this day for the same purposes (Alexianu *et al.* 2007: 102-123). The first data on such usage are very old. On 8 August 1461, a document mentions a real estate transaction, including the sale of a part of a village for 'two houses and a salt source'; this phrasing suggests the importance of the salt spring within the transaction (*DRH* 1976: 141). Just a few years later, on 25 April 1475, Prince Stephen the Great gave to the Humor Monastery 'a mountain, namely Ostra, and the salt spring of Ostra, because the mountain and the salt spring have long belonged to them' (*DRH* 1976: 304; Isac 1989: 201, 254, 258). In order to acquire the right to use the water of these salt-water springs, it seems that beneficiaries paid a tax called *slatină* (spelled as the spring per se). In 1763, the prince ordered the *solari* to stop collecting the *slatină* from the Târgu Neamţ Monastery for the exploitation of the salt spring at the margin of the town, in some clearings on the Timuş River (*CDM* 1968: 465, 501).

There are incomparably richer data on this type of salt exploitation starting with the last quarter of the 18th century, when the Subcarpathian area drew the attention of Austrian authorities. After the annexation of northern Moldavia (Bukovina) by the Habsburg Empire in 1775, Vienna reports stated that the province lacked a source of rock salt and that local needs were satisfied by imports of recrystallized salt from Galicia and rock salt from Târgu Ocna. Attempts were made to discover local deposits or to produce recrystallized salt from the brine of existing salt springs (Ceauşu 1982: 378). Such salt springs were discovered at Vijniţa and near the Putna Monastery ('they had been used since time immemorial until the Polish neighbours pulled their tricks and made people use their recrystallized salt devices not far from the border; thus, [springs] were simply abandoned') (Ceauşu 1982: 378-379). Several years later, a record of the time details the way salt was obtained from the spring near Pârteşti: villagers 'make a four-sided stake by breaking the wood into pieces, they stir fire underneath it and let it burn in flames; then, they take brine from the first spring mentioned and they let it drip slowly on the flames. Salt adheres to the burning wood and then villagers take the cooled wood, remove the salt by hitting the wood, pack it into bags and other containers and then take it home at the beginning of winter, for themselves and for their cattle' (Ceauşu 1982: 379). The report of a special commission founded in 1784 indicated the possibility of discovering a salt rock deposit near Solca, where a newly founded Salt Assay Office (*Salzversuchsamt*) began prospecting the area (Ceauşu 1982: 380). Until such a deposit would be discovered, they built in the regions of salt springs near Solca a salt boiler (*Coctur*) that produced recrystallized salt up to 1793; meanwhile, they discovered the salt lode of Cacica. In 1790, the Salt Assay Office in Solca was closed; recrystallized salt by boiling was however still produced at Cacica, by evaporating the brine obtained in the spring after washing the salt rock (Ceauşu 1982: 381-385). A traveller through Bukovina in the year 1802 knew that this region comprised around 49 salt springs in the localities of Sadova, Stulpicani, Pârteşti, Soloneţ, Solca, Pleşa, Vicov, Crasna, Putila, Mihova, Berhomete and Vijniţa, and that rock salt (for human consumption and for livestock– 'licking salt') was extracted from mines functioning at Pleşa and Cacica in that period (*Călători XIX* 2004: 160-161).

During the last Austro–Russian–Turkish War of the century, which began in 1787, the Austrian troops occupied five counties near the border with Transylvania (Suceava, Roman, Neamţ, Bacău and Putna). Soon after, in 1790, captain Hora von Otzellowitz made a map of these regions to which he attached a descriptive appendix comprising essential descriptions regarding the population, draft animals, the buildings within towns and villages comprised in censuses, the geographic position of settlements, roads and natural resources. From the perspective of the information relevant to our matter, the cartographic work of the Austrian officer provides data on salt exploited in various points within the five counties. We synthesize them as follows: 1) Bălţăteşti (county of Neamţ) – 'There are two salt springs near the village'; 2) Bodeşti (county of Neamţ, on both sides of Cracăul Negru creek) – 'There is a salt spring to the north, with a road leading to it'; 3) Cuejdiu (county of Neamţ) – 'South-westwards, on the Slatina creek, there is a salt spring'; 4) Luncani (county of Bacău, on the Trebeş creek) – 'Southwards, on the Slatina creek, there is a salt spring, used by local inhabitants. Some boil brine right there, while others carry it in containers using wagons'; 5) Muntioru (a mountain south-west from the village of Nerej, county of Putna) – 'Underneath this mountain, at the spring of the creek with the same name, there is very white rock salt, better than mine salt. There is no exploitation equipment, only villagers nearby use it for their own needs'; 6) Negreşti (county of Neamţ, on the Almaşul Mare creek) – 'North-eastwards there is a salt spring'; 7) Oşlobeni (county of Neamţ, on the Cracăul Negru creek) – 'North-eastwards there is a salt spring, with a road leading to it'; 8) Şarul (county of Suceava, on the Neagra creek) – 'There is a salt spring here'; 9) Târgu Ocna (county of Bacău, on the Trotuş valley) – 'Salt mines are situated to the north'; 10) Tiseşti (county of Bacău, where Slănic discharges into Trotuş) – 'The village has several mine mouths'; 11) Ţolicea (a creek in the county of Neamţ, near the village of Tărpeşti) – 'There is a salt spring near its centre [...]' (Donat and Papacostea 2015: 25, 37, 80, 151, 171, 176, 186, 276, 286, 298).

There is also evidence for the subsequent exploitation of this natural resource. At Bălţăteşti, there was a balneary resort in late 19th century that functioned based on three and then four salt-water springs (the analyses conducted at that time showed that one fourth of the water consisted of sodium chloride) and on sulphur springs (*MDG* 1898: 808-810). At Luncani

they still obtained salt (*huscă*) by boiling water from salt springs. It was not the only place people obtained salt using this method. Another '*huscă* factory' seems to have been constituted on 18 February 1815, by the *căminar* (tax collector) Tudurache Ciurea, on the estate of Râșca Monastery in the mountains, thus west from the estate of Slătioara (today a village), where they had discovered a smaller salt spring (Ciubotaru *et al.* 2013: XII). However, at Luncani, in the county of Bacău, a contract was concluded on 1 August 1817 between a group of leaseholders and villagers in order to exploit salt from local springs by recrystallization. The spring was leased for 12 months (even if the spring had dried out in the meanwhile). Wood for boiling the brine and for the workers' households was obtained for free from the village forest; the contract also mentioned the construction of a storehouse to deposit salt, and workers had to take care of the access road to the installation (Murariu 1999: 219-220). They obtained here *huscă*; the process continued even in 1824, when the 'factory' belonged to Duldner – the secretary of the Prussian Agency in Iași – associated with the *căminar* Tudorachi Ciurea and the *spătar* Petrachi Cazimir. All 38 workers registered in 1820 at the *huscărie* of Luncani were *bejenari* ('immigrants' who had crossed the mountains from Transylvania) given that most had Hungarian names (Ciubotaru *et al.* 2013: XI, XII, 429). It looks like, bythe late 19th century, salt was no longer obtained at Luncani by evaporation, at least not in great quantities, as confirmed by a survey of the time, which specifies that this village includes 'sulphur springs and salt springs, from where salt used to be extracted by evaporation' (*MDG* 1901: 199).

Going back to the list made by captain Otzellowitz in 1790, we must also note that rock salt on the Munteorul Mountain – a superficial salt – was still used at the end of the 19th century (*MDG* 1901: 420).

We cannot end this section without mentioning some of the observations made by the physician and naturalist Baltazar Hacquet, who visited Moldavia in the period 1788–1789. In Bukovina, dominated by Austrians in that period, he encountered – while travelling towards mountains – salt springs exploited by Austrian authorities at Pleșa, Slătioara, Trestieni and Pârteşti. 'After taking it out of the pits, they bring the water to the evaporation equipments, eight of them in all the villages. Salt ends up in the shape of flatbread after long-time boiling, because the water within these sources only contains 'nine to fifteen degrees of salt' (*Călători* 2001: 821-822). In exchange, near the Solca Monastery there is 'the main refinery of Bukovina salt', with two salt water extraction pits (the main pit was 36 *stânjeni* deep, water was taken out using large containers made of animal skin, carried by horse-driven wagons) and an equipment with 'large buckets' (*Călători* 2001: 822).

At the end of this stage within our journey across medieval Moldavia, we are able to provide to all persons interested a list of the medieval Moldavian places where historical sources of the time attest to salt exploitation (Figure 8).

No.	Place and date of the first documentary occurrence	Current location	Type of salt exploitation
1.	Bahna, village in Bukovina; 1788	former village, currently in the Straja village, district of Suceava	salt spring
2.	Bălţăteşti, village in Neamţ county; 1790	Bălţăteşti village, district of Neamţ	two salt springs
3.	Bodeşti, village in Neamţ county, on the Cracăul Negru creek; 1790	Bodeşti village, district of Neamţ	salt spring, northward
4.	Cacica, village in Bukovina; 1790	Cacica village, district of Suceava	mine exploitation (rock salt) and salt spring (recrystallized salt)
5.	Chilia, at the mouths of the Danube; 1798	Chilia Veche village, district of Tulcea	natural evaporation (?) (sea salt)
6.	Cuejdiu, village in Neamţ county, on the Cuejdiu creek; 1790	Cuejdiu village, district of Neamţ	salt spring, to the south-west, on the Slatina creek
7.	Grozeşti, village in Bacău county; *c.* 1776	Oituzul village, district of Bacău	surface exploitation (rock salt) [?]
8.	Ibăneşti, village in Dorohoi county; 1652	Ibăneşti village, district of Botoşani	mine exploitation (rock salt) [?]
9.	Jicovul, village in Bukovina; 1788	Vicovul de Sus village or Vicovul de Jos village, district of Suceava	salt spring

Figure 8. List of salt exploitations in 14th–18th centuries Moldavia.

No.	Place and date of the first documentary occurrence	Current location	Type of salt exploitation
10.	Salt lakes at the north of the mouths of Danube; 13th century [?]. Sasâc/ Cunduc lake, Şahan/Murtazi lake and Alibey-ulu lake; the end of the 19th century	Sasyk/Kunduk lake, Shagany lake and Alibey lake, Odessa region, Ukraine	natural evaporation (sea salt); salt exploitation facilities called *tezlale* in the 19th century
11.	Luncani, village in Bacău county, on the Trebiş creek; 1790	former village, in the north-west of Grigoreni village, district of Bacău	salt spring, on the Slatina creek (recrystallized salt – *uscă* –, obtained by boiling salted water)
12.	Muntioru, mountain at the south-west of Nerej village, in Putna county; 1790	mountain near Nereju village, district of Vrancea	surface exploitation (rock salt), at the source of the Muntioru creek
13.	Negreşti, village in Neamţ county, on the Almaşul Mare creek; 1790	Negreşti village, district of Neamţ	salt spring, to the north-west
14.	Ocniţa, village [?]; 13th century [?]	Ocniţa town, Republic of Moldova	surface exploitation (rock salt) [?]
15.	Ostra, mountain and creek in Suceava county; 1475	creek near the Ostra village, district of Suceava	salt spring
16.	Oşlobeni, village in Neamţ county, on the Cracău Negru creek; 1790	Oşlobeni village, district of Suceava	salt spring
17.	Pârteşti, village in Bukovina; 1776	Pârteştii de Jos village or Pârteştii de Sus village, district of Suceava	salt spring
18.	Pleşa, village in Bukovina; 1788	Pleşa village, district of Suceava	salt spring
19.	Poduri, village in Putna conty; 1810	Podurile village, district of Vrancea	surface exploitation (rock salt)
20.	Putna, village in Bukovina; 1775	Putna vilage, district of Suceava	salt spring
21.	Runc, village in Bukovina; 1788	Runcul village [?], district of Suceava	salt spring
22.	Slătioara, village in Bukovina; 1788	Slătioara village, district of Suceava	salt spring
23.	Solca, village in Suceava county; 1461	Solca town, district of Suceava	salt spring
24.	Şarul, village in Suceava county; 1790	Şarul Dornei village, district of Suceava	salt spring
25.	Tatar-Bunar, village in Bugeac; 1790-1781	Tatarbunary village, Odessa region, Ukraine	salt lakes
26.	Târgu Neamţ, town in Neamţ county; 1673	Târgu Neamţ city, district of Neamţ	salt spring
27.	Târgu Trotuş (succeeded by Târgu Ocna), in Bacău county; salt mines near the two towns; 1457	Târgu Trotuş village and Târgu Ocna town, district of Bacău	mine exploitation (rock salt)
28.	Tiseşti, village in Bacău county, on the Slănic creek; 1790	former village, now united with Târgu Ocna town, district of Bacău	mine exploitation (rock salt)
29.	Trestieni, vilagge in Bukovina; 1788	[?]	salt spring
30.	Ţolicea, creek in Neamţ county, near Tărpeşti village; 1790	near Tărpeşti village, district of Neamţ	salt spring, near the source of the Ţolicea creek
31.	Valea Sării, village in Putna county; 1790	Valea Sării village, district of Vrancea	surface exploitation (rock salt)
32.	Viişoare, near Târgu Ocna town, Bacău county; 1787	Viişoara village, district of Bacău	surface exploitation (rock salt) [?]
33.	Vijniţa, village in Bukovina; 1775	Vyzhnytsya village, Chernivtsi region, Ukraine	salt spring
34.	Voitinel, village in Bukovina; 1784	Voitinelul village, district of Suceava	salt spring

Figure 8 continued. List of salt exploitations in 14th–18th centuries Moldavia.

Salt 'journey' through Moldavia

The roads

After outlining the places and people who bring salt to the surface, we shall continue our journey to other people, who transport and then sell salt, following the roads crossing Moldavia in those times. The importance of communication pathways for of rural life has been highlighted more than once (Chelcu 2006: 148). At the end of the 14th and the beginning of the 15th century, the Black Sea basin became a point of confluence for the great commercial roads that connected Central and Northern Europe with the Asian space by crossing the Carpato-Danubiano-Pontic territories. An effect of this was the emergence and development of towns that can be studied closely with commercial roads, 'because [roads] and towns are inseparable. Irrespective of the period or the region, there is no town without a road' (Rădvan 2011: 346).

From places near such towns, like Târgu Trotuş or Târgu Ocna, salt was sent to diverse destinations. Any merchant could buy it right from the stores near salt mines, for a better price. Afterwards, he could sell it anywhere in the country, except for salt stores at the borders, where only the prince or the leaseholder had the right to sell salt (Vitcu 1987: 39). The salt stores near salt mines were called *mâglă*, but these were not the only places where salt expected its customers. In 1742, a Minorite friar who came to assess the status of Catholic churches in Moldavia noted that the abandoned stone church in Trotuş was used by a boyar as salt store (*Călători* 1997: 318). It was not recommended to keep salt in storage for very long, because it was not productive. In 1808, salt production in Ocna was leased for two years (an extension of the contract, actually), in order to help the beneficiary keep within the mine stores the salt that he had not managed to sell (Dragnev *et al.* 2016: 347).

Bought by merchants from the storehouses near mines (*Călători* 1973: 249), salt travelled on the road network connecting – through Moldavia – Western Europe, Poland and the Baltic seashore to the Black Sea harbours, to Walachia and to the Ottoman Empire. A road from Transylvania passed through the Ghimeş defile on the Trotuş valley, crossing Comăneşti. 'From here, meaning the salt mines of Ocna, salt headed towards Târgu Trotuşului, where it encountered the road from Braşov, which crossed Oituz, the only road accessible to wagons' (Gonţa 1989: 42; Giurescu 1997: 318).

Subsequently, from Târgu Ocna, salt left on the road crossing the villages within the county of Bacău: Beţeşti ('The road that brings salt from Ocna crosses it'), Blăgeşti ('Carts with salt from Ocna to Piatra pass here'), or Valea lui Ion ('The road bringing salt from Ocna crosses it'). In general, the pathways from Târgu Ocna were better noted, as shown by an Austrian depiction of the late 18th century: 'because of salt mines, roads are well preserved' (Donat and Papacostea 2015: 33, 36, 286, 305).

Arrived in Bacău, salt travelled up towards the Siret valley to Suceava or through Roman, Paşcani and Târgu Frumos, towards the future capital of the country, Iaşi (Gonţa 1989: 35). In 1651, a foreign traveller who had just left the capital encountered a convoy of 150 Kazak wagons transporting salt from Târgu Ocna to Umanowa, in Ukraine (*Călători* 1973: 452). A year later, given that Kazaks conducted bounty raids in Moldavia, they were seen with 400 wagons full of salt, 'maybe looking for additional profit' (*Călători* 1973: 473). A note written after 1749 mentions a transport of salt made in the summer of the same year, from 'the mine hill' towards Sculeni, to Pruth (Caproşu and Chiaburu 2008a: 567). In this case, it was a veritable 'Salt road' or 'The Great road of Sculeni' on the Siret valley, in Bacău, Roman, Şcheia, Tîrgu Frumos, Podu Iloaiei, towards Sculeni, on Pruth. From Roman, a branch of this road ('Lipcani road') headed towards Hârlău, Botoşani and Lipcani (Popp 1938: 278; Vitcu 1987: 164, 165). From Târgu Ocna, salt was also transported to Leova, on the left side of Pruth, through Tecuci, then on the Bârlad valley and towards Fălciu (Vitcu 1987: 165). Finally, an essential road for Moldavian exports to Istanbul, also called the 'the Mine Road', went down the Trotuş valley at Adjud, and then it reached Galaţi, Brăila or Chilia, Danube harbours (Gonţa 1989: 42; Vitcu 1987: 164-165). For instance, salt donations for the Holy Sepulchre in Jerusalem – made by Nicolae Mavrocordat in 1715 – arrived to Galaţi; here, the abbot of the local monastery of St Gheorghe had it shipped to Istanbul (Codrescu 1889: 115-116).

Means of transportation

From the mine stores, salt belonging to 'princes, monasteries, boyars or merchants' (Caproşu 2006: 548) was transported towards town storehouses or the country's customs points. Various medieval sources attest that merchandise transportation in Moldavia was ensured by horse-drawn or oxen-drawn wagons, by 'the Massive German wagon with even wheels', or starting with the 18th century in the best case, the Oriental (*araba*) wagon, 'easier and more flexible' (Chelcu 2006: 157).

For most domestic transportations, authorities rented wagons from inhabitants, paying for them with money from the Treasury fund (Chelcu 2006: 158), if inhabitants who had a means of transportation were not obligated by law to work for the central power (Vitcu 1987: 40). On 6 June 1662, Prince Eustratie Dabija ordered salt for the princely cellar to be brought by the inhabitants from Roman and from the villages nearby, because

Şcheia and Târgu Frumos were deserted (*CDM* 1968: 187). There were also professional transporters, such as the inhabitants of Comăneşti and Dărmăneşti villages on the Trotuş valley; they practiced this profession based on old privileges (Chelcu 2006: 158-159). On 31 October 1741, the mine administrators were ordered to send to the princely court ('to the princely cellar') in Iaşi 300 salt boulders with rented wagons, paid by the administrators in Târgu Ocna; the amount paid for renting would later be subtracted from the money to be sent to the Treasury (Istrati 2008b: 126). A year later, a similar order regarded a transport of salt for Iaşi: the mine administrator was taskedwith renting wagons; he paid a part of the money to the transporters, and the rest would be received in the capital upon delivery (Istrati 2008a: 142). The guild of those who rented their wagons for merchandise transportation (*chiragii* or *cărăuşi*) had financial obligations towards central authorities: foreign transporters gave three *bani* of each *leu* within the rent contract, for salt transportation included; Moldavians were exempted from this tax (Caproşu 2005: 113).

Salt was transported either in large chunks (in 1789, a transaction in the yard of a great boyar involved 56 chunks, each weighing 36.4kg on average), or ground up and put into bags (BAR Ms. A2979: f. 39 v.). The salt water of springs was sometimes transported using containers loaded in wagons, such as the aforementioned brine of Luncani, at the end of the 18th century (Donat and Papacostea 2015: 151).

Taxes and beneficiaries of salt income

Along the journey on these roads, salt was taxed using the medieval system of domestic customs. In late 18th century, it was 1 *para* (= 30 *bani*) per item weighing 36.4kg (BAR Ms. A2979: f. 39v.). In towns there were taxes for the merchandise sold, such as *cantariatică* (a tax for weighing the merchandise in small towns), three *bani* for each 100 weighed *ocale* in the mid-18th century (Caproşu 2005: 252, 345), and *mortasipie* (tax for merchandises sold in small towns). In the period 1740-1741, they charged four *bani* for each wagon of salt entering the town (Caproşu 2001a: 305). To finance repairs for the roads of Iaşi, which were covered by wood, new taxes were imposed in 1797 for the merchandise wagons entering the capital. The wagons transporting salt paid half a *para* per traction animal, except for the wagons bringing salt in the period when mines were leased and rented from counties (Caproşu 2007b: 115; Dragnev *et al.* 2016: 193). Outside towns, transporters paid a tax (*brudină*) to cross the shallows or bridges.

However, the prince granted tax exemptions, mostly to churches and monasteries. Hence, on 30 September 1453 and 25 August 1545, the monastery of Moldovița was exempted from any tax by the princes of those periods, for three wagons carrying merchandises of the monastery, irrespective of their types. However, tax exemption was only for use, not for sale, and it included salt 'for all customs points and all salt mines' (or: 'they will not pay taxes when they go to get salt') (Caproşu and Zahariuc 1999: 8, 10).

At the borders or at customs points within towns there were customs charges for products exiting the country. A register comprising the customs charges of Iaşi, which was a princely customs point, excerpted from the customs register of Moldavia and drafted up in the period 1761–1764, states that the customs charges per salt boulder is two *bani* for exiting the country; there was no fee for domestic consumption (Caproşu 2004: 338, 343). The princely customs was leased early in 1796; salt had a different customs charge than other merchandises: hence, for exported salt one paid two *parale* per boulder, except for the salt intended for the Ottoman Empire, for which there was a 50% discount (Caproşu 2007b: 2).

The money obtained from the salt sale represented an important source of income, especially for the prince. Salt extraction and sale were the monopole of central power. Besides the storehouses at the mines, princes also had *sărării* (stores) in the bigger cities, where salt could be bought and then sold for profit in villages and small towns (Cihodaru 1984: 124). The 18th century represented a period of reforms promoted by the ones on the throne. Such modernizing initiatives included, for instance, the aim of determining clearly the incomes of each dignitary function granted to boyars. At a certain point, sometime in mid-18th century, mines provided a part of the income for the great *Ban*, namely 'three *bani* per salt boulder – both *steții* and smaller boulders – from all salt loaded from the mines' (Istrati 2008a: 105). However, this was not the only dignitary function receiving income from salt. After 1754, the holder of the great *logofeție* (High chancellor) charged three *lei* per bag, used for leasing the income of mines for a year, to which a fixed amount of 500 *lei* per year was added; they came from the Cernăuți abbot and they represented money from *solărit*. Two other dignitaries – the great *spătar* and the great *ban* – charged a *para* per boulder of salt sold in mines. The great *cluceri* also took some of the *solărit* money: two *galbeni* (golden coins) per sheepfold, not two *bani* per animal in the sheepfold, as they had previously charged (Caproşu 2001b: 539-540). Through successive regulations issued in 1775, 1776 and 1777 that complete and clarify one another, some of the great dignitary functions in the country completed their incomes using a part of the incomes from the mine leasing or using a predetermined proportion of that income, charging fees for the salt sold near Târgu Ocna. The taxes for the retail sale of salt constituted the income of dignitaries who represented

the central power in the territory. The pârcălab (county administrator) of Galaţi first took a part of the taxed merchandise – which he then sold to his own benefit –and afterwards he charged six *ocale* of salt for each large wagon unloaded in Galaţi or three *ocale* for each small wagon. On 1 October 1742, the prince ordered to his representative in the county of Bârlad to collect as part of his income – besides various fines – taxes for several types of merchandise sold in town: thus, the *pârcălab* of Bârlad charged one boulder for each wagon that was stationed in the town. A year before, his peer in Branişte collected the income similarly, from fines for misdemeanours and from taxes on merchandise sales: for each wagon transporting salt that entered his jurisdiction, he charged two *potronici* and two *ocale* of salt (Caproşu 2005: 120; 122-123; 126; 239-240; 332-333; Istrati 2008a: 274; 583).

Another important category of beneficiaries of salt income – redirected by the prince – is represented by the churches and monasteries in the country or those situated in the holy places of Christendom. From the mid-18th century, a significant beneficiary of the income obtained by the central power from mines was the monastery of Saint Spiridon in Iaşi, including the hospital within its premises. On 1 January 1757, Prince Constantin Racoviţă donated to the aforementioned church the Târgu Ocna estate 'and the entire hill from where they extract salt', as well as a tenth of the amounts obtained for leasing the mines. As for the mines directly managed by the princely administration, the monastery had an assignee at the mine charged with taking the tenth part of the boulders and *steţii* taken out of the mine, a donation that would be later confirmed in the same conditions by the subsequent princes ('for all salt from the hill'). This income was collected annually and carefully noted in the income and expenditure register of the monastery starting with 1761 (Caproşu 2004: 60, 141, 218, 282, 361, 522, 547 etc.). Later, the monastery took salt in kind, in cash or as debt and sold it independently, as it occurred in 1779, for instance, when they transported from Târgu Ocna to Iaşi no less than 3000 *ocale* of salt (Caproşu 2005: 116, 593). The monastery also collected the *solărit* in Vrancea for fine salt, but the amount was negotiated with local inhabitants (Caproşu 2007a: 326; Caproşu 2007b: 267). The independent sale of salt was not very profitable for the monastery, as shown by a princely document confirming old donations from 1785: salt was not always sold 'in the best of times' (when it sold well) or it was sold 'with losses' (Caproşu 2006: 355, 388). The most complete data concerning the rights of this monastery in Iaşi from mines is written in a princely document dated September 1, 1776: the holy establishment will take from Ocna three *bani* 'per salt boulder, per *steţie*, per bucket and per *coteţ* of salt, to be sold and collected from the *măglă* by the buyer and by the mine administrator; they will take the salt and get it down the hill or they will send it to towns' (Caproşu 2005: 264, 357).

In its turn, in the 18th century, the Moldavian Metropolis received consistent amounts of money from the princely incomes generated by salt exploitation. In the autumn of 1759, upon the proposal of great boyars, the prince granted the Metropolis the right to collect a *para* for each boulder or *coteţ* of salt sold in the mines, but paid by the buyer (Caproşu 2004: 211). This provision was later extended: theMetropolis collected this amount for each boulder or *steţie* ('irrespective of the boulder size') from salt exploitation, whether it was exploited directly or leased (Caproşu 2005: 137). In 1791, the Metropolis received both the variable income (a *para* per salt boulder from the mine) and 7200 *ocale* of salt in kind or a fixed amount of money from the income of the princely *cămară*, namely 2000 *lei* in 1793 (Caproşu 2007a: 31, 200; Caproşu 2007b: 15).

Another tax for the salt extracted from princely mines and then sold – one *ban* per boulder, which until 6 June 1765 was destined for the school on Mount Athos – was afterwards sent to schools within the country (Caproşu 2004: 572). Various amounts within the income from princely mines were destined to health assistance: for the Ocnă hospital, for the guild of local mine workers, subordinated to the hospital near the monastery of Saint Spiridon (with a surgeon and a pharmacist); for the physician who took care of all the inhabitants in Iaşi, as well as for the 'public' pharmacy of Iaşi (Caproşu 2005: 51, 84, 145, 199, 479).

Salt stores and merchants

Let us return to the salt stores of the great cities, where salt was deposited before being sold in retail contexts (*sărării*). In Iaşi, this store was mentioned by the sources of the time in the summer of 1711, when a general within the suite of Peter the Great – during a campaign against the Turks – was ordered to get an amount of salt from Iaşi for the needs of the army (*Călători* 1983: 435). The entire neighbourhood that hosted the salt store – situated in the north of Moldavia's capital – was given this specific name: *Sărărie*. Considering the data available thus far, the first mention of this toponym in documents dates to 3 January 1671, when a document related to the sale of a wax press includes the Street of *Sărărie*, where the item to sell was located (Caproşu 2000a: 306, 323, 408). The neighbourhood with the same name was mentioned in later records, starting with 10 March 1682, for instance, when a document about a patrimonial conflict for a house on Uliţa Nouă also noted that the house was situated 'at *Sărăria Veche*' (Caproşu 2000a: 518, 520-1; Caproşu 2000b: 430). Subsequently, *Uliţa Sărăriei* [Sărărie street] – also called *Uliţa Ocnii* [Salt Mine street] (Caproşu 2000b: 484), *Uliţa Sării* [Salt street] (Caproşu 2004: 307) or *Uliţa Drumului*

Sării [Salt Road street] (Caproşu 2007a: 312-313) – was increasingly mentioned in documents related to all kinds of commercial transactions conducted in Iaşi to this day. Actually, *Strada Sărărie* is actually an important artery in the north of the city.

Either directly from mines or from salt stores, salt was bought by retail merchants called, of course, using a term derived from salt: *sărari* [salt sellers]. They are mentioned for the first time in documents in the period 1643-1644, when the village *vătăjel* (clerk) in the county of Vaslui is listed as a certain Irimia *sărariul* (*DRH* 2005: 150). On 12 July 1667 in Iaşi, the sons of Neniuţul *sărar* sell an inherited house on *Uliţa Nouă*, hence near the city salt store (Caproşu 2000a: 150, 153, 281). Three years later, Lazăr *sărar* was in town with business (Caproşu 2000b: 424). At the beginning of the subsequent century – in 1702 and 1723 – the documents regarding the sale of houses in Iaşi are also signed as a witness by Grigoraş. He was the son of Maricuţa *sărăriţa* (besides her given name, they added the former husband's occupation, according to local customs; however, she may have sold salt herself in the area of Uliţa Nouă, near the city's salt store) (Caproşu 2000b: 158, 550). Furthermore, another *sărăriţă* [female salt seller] is mentioned in a document dated 1727 (Caproşu 2001a: 23). A 1774 census made by the Russian occupation troops in Iaşi included a certain Costandin who was a barkeeper, but who used to be *sărar*; the census also mentioned a certain Ion *sărar* (Caproşu and Ungureanu 1997a: 77, 125). The 1820 census conducted by Iaşi authorities for tax purposes listed as inhabitants of this neighbourhood Nusăn *sărar*, Iţic *sărar* and Solomon *sărar*; the last two are Jewish (Caproşu and Ungureanu 1997a: 360, 362, 365). Several years later, in 1824–1825, the *sudiţi* – foreign subjects who lived and worked in Moldavia – were registered by authorities. Among them, there were two Jews: the first was Berl Herscu of Cernăuţi, (married in Moldavia, who lived in the Sărărie neighbourhood, where he had a warehouse; his occupation was salt trade). The second Jew was Mozis Aschinos, a young man from Galicia; married to a 'local'; he lived in a rented house and he sold ground salt (Caproşu and Ungureanu 1997b: 188, 222). Besides the Jews who had dealt with commerce permanently in the region, Moldavia recorded a significant flow of Polish Jewish immigrants beginning in the first decades of the 18th century; they subsequently disseminated to all towns across the country. Sources show they were involved in commerce with livestock, alcohol, tobacco, cotton, rice, tar, salt and other goods (Iorga 1914: 48, 61). One of them – a small merchant in the Chişinău town– complained in 1742 that not long before, due to the war, his store had been robbed, 60 salt boulders included (Istrati 2008a: 461). Naturally, Jews were not the only ones to sell salt in Moldavia. Among those who hoped to make money from it in 1711, we mention here only the partnership between several persons – including a house painter and a blacksmith – to transport 900 boulders to Galaţi, another 400 *steţii* to Căuşeni (in southern Moldavia between Pruth and Dniester) and 120 boulders to sell in Iaşi (Caproşu 2004: 201-202).

However, the great salt commerce involving exports to neighbouring countries and even farther was specific to the great merchants of the region. Moldavian salt was very popular for export, and the Ottoman Empire was an important outlet from this perspective. In the late 16th century, the incomes obtained by Moldavian mines drew the attention of the suzerain power – the Ottoman Empire. Early in the summer of 1595, in order to receive a function related to Moldavia, an Ottoman dignitary promised to 'renovate' the salt mines (*tuz madenleri* in Osmani) in order to collect more income for the Ottoman tax system (Maxim 2008-2009: 106). A great part of the salt extracted was transported to the Ottoman Empire, but this involved a competition issue with the salt extracted from Walachia. On 5 October 1742, following higher orders from Istanbul, the country's prince ordered the mine administrators and the dignitaries of Galaţi not to allow Walachian salt transported on the Danube higher than Brăila, or the other way around; also, not to allow Moldavian salt on the river beyond Brăila, the Walachian harbour on the Danube (Istrati 2008a: 271).

However, the Moldavian salt exports covered significantly larger areas. According to Marco Bandini, in the 18th century, salt was exported to Russia, Poland, Ukraine, Turkey and Tartaria (Bandini 2006: 130). Not long after the beginning of the subsequent century, the sitting prince Constantin Duca – during his second reign in Moldavia (1700-1704) – made commerce with salt and wine in the Kazak Country, where he had sent several wagons (Axinte Uricariul 1994: 197) according to registers of the time. Dimitrie Cantemir shows that in his time 'the inhabitants of Budjak and Crimea and even those of faraway countries came here every year and loaded salt in their ships' (Cantemir 1973: 105). Such salt was exported to the north, in Poland (Istrati 2008a: 246), to the south, at Constantinople, or to the East. Princes made sure they advised their dignitaries in the border areas to 'promote' Moldavian salt among potential consumers. On 11 November 1741, a 'circular' was sent to the *pârcălab* of Galaţi, to the Greceni captain and to the prince's representative at Bender to make deals with merchants in Galaţi, Ismail and Bender, respectively; the last were invited to buy salt from the Ocnă and to pay for it in Iaşi, to the great *vistiernic* (Istrati 2008b: 140).

There was no need for pressure when it came to profitable business involving salt. In the mid-18th century (1740), an anonymous Turkish traveller witnessed with his own eyes the arrival of ships from Constantinople to Galaţi, where 'they export timber

and salt boulders' (*Călători* 1997: 266); Galaţi also hosted warehouses for the products to be transported on the Black Sea, salt included (*Călători* 2000: 451). In 1776, the Polish diplomat Karol Boscamp-Lasopolski was welcomed in Iaşi by Prince Grigore Alexandru Ghica. The former had been mandated by his king to conclude an agreement for salt imports in the southern regions of Poland from the Moldavian mines. This agreement was, however, blocked by the Ottomans, who did not want to let the Iaşi prince conclude agreements that would extend his autonomy (*Călători* 2000: 232). About the same period, Jean-Louis Carra, in his journal of travels to Moldavia, noted that the country's salt was exported to Poland and to the Ottoman Empire (*Călători* 2000: 248). They brought salt from Moldavia to southern Poland, even after the annexation of this region by the Habsburg Empire: a traveller through Moldavia in the year 1783 seemed to know details about the conclusion of an agreement for Moldavian salt, made by a subject of the Vienna Court. The said subject even deposited a monetary warranty for the agreement (*Călători* 2000: 547).

However, post 1800, large amounts of salt were sent on the other side of Pruth, which was soon to become a border, and then farther away over Dniester, in the Russian Empire. The customs lease contract of December 1806 stipulated that for salt passing the border one would be charged two *parale* a boulder, except the salt heading to Turkey, which would be charged half of the above (Dragnev *et al.* 2016: 15). Nonetheless, in 1808 salt arrived in Russia, at the Movilău point, after passing Dniester on floating bridges (Dragnev *et al.* 2016: 255; 263). Impressive amounts of salt were shipped this way; they were bought by Jewish merchants from the Polish regions annexed to the Russian Empire in the 18th century. In 1808, for instance, one of them had concluded contracts for 1,760,300 *ocale* of salt from Moldavia; the produce was bought from Movilău and Dubăsari; should a conflict emerge, the salt warehouses there would be sealed. The road was not free of dangers: in the summer of 1808, a salt transport of Moldavian and Russian transporters towards Movilău was robbed (Dragnev *et al.* 2016: 278; 310; 316-317; 325-326).

Post 1812, namely after the annexation of Moldavia between Pruth and Dniester to the Russian Empire, including the region formerly part of the Ottoman Empire (the south of Pruth – Dniester interfluve, also called Budjak), after another Russo-Turkish war,an issue emerged related to salt export from Bessarabia to the Russian Empire and to other regions, because the new province was not yet part of the Russian customs system. The old Dniester border still included a sanitary and customs barrier, with customs points at Dubăsari and Movilău (this was also 'the direct and most favourable commercial pathway from the Romanian Principalities to Russia [...]'); this barrier was dissolved as late as 1830 (Tomuleţ 2012: 189, 230).

Years	Salt exports (in silver rubles)
1802	86,400
1803	81,500
1804	42,000
1805	115,100
Total	**325,000**

Figure 9. The value of salt exports in Russia (1802–1805) (Tomuleţ 2012: 338).

At the beginning of the 19th century, salt exports from Moldavia (along with Bessarabia) and Walachia to Russia intensified through the customs points of Movilău and Dubăsari, as indicated by data centralized at Tomuleţ (Figure 9).

Other data suggest that – right after the outbreak of the Russo-Turkish war in 1806 – through the customs points of Movilău, Isakoveţ and Dubăsari, approximately seven million *ocale* of salt were exported using Dniester, which accounted for a third of the Moldavian exports. Salt extracted from the county of Bacău (Târgu Ocna) was transported in large amounts from the warehouses of merchants and leaseholders of Movilău (it went to the provinces of Podolia, Volhynia and Kiev) and Hotin (Tomuleţ 2012: 340). Because it was such an important item, in 1810 the Russian authorities asked the Moldavian boyars to draft up a detailed report on salt exploitation and on the incomes obtained by selling salt. Of the 17-18 million *ocale* produced, around 10 million were exported on Dniester (7 million through Movilău and one million through Creuleni) and through Galaţi (2 million) (Bulat 1938: 124).

Salt was shipped through Dniester even after the Russian authorities adopted a restrictive commercial regulation in 1825. This regulation stipulated a period of 12 days for transiting merchandise to arrive from the customs points on Pruth and Danube to Dniester customs points. At the end of 1825, the Russian merchants who had bought from Moldavia large amounts of salt (and wine) complained that this interval was too short to transport salt from Sculeni to Movilău (Tomuleţ 2012: 210). Furthermore, special attention was paid to salt 'extracted from the Bessarabian lakes' (Tomuleţ 2012: 173) and to its customs charges for transportation to Russia. The customs regulation elaborated in 1825 provided that salt could be exported to Russia only through the northern customs points of Dubăsari and Movilău; the protectionist measure was meant to limit this type of export. The salt from Bessarabia, which was of higher quality than Crimean salt, 'could seriously damage this industrial branch within southern Russia'; indeed, exports of salt had increased from 436,120 *puduri* in 1820 to 1,652,478 *puduri* in 1825 (1 *pud* = 13 *ocale*) (Tomuleţ 2012: 206, 208). Certain exceptions were made following pressures from merchants: salt could be shipped on the Dniester and through the customs

points of Maiaki and Parcani, towards Odessa, Nikolaev and Ovidiopol. Nonetheless, the amounts of salt exported to Russia through the customs points of the Odessa county dropped from 1,670,345 *puduri* in 1824 to 1,011,432 *puduri* in 1828 (Tomuleț 2012: 209, 211). In 1826, for instance, merchants sent complaints to the head of the Customs County of Odessa, showing that they had important amounts of salt in Akkerman and Bender (extracted since 1824) for the export of which they had commercial certificates from the Administration of Bessarabia salt mines (Tomuleț 2012: 211). The fact that this salt was extracted from southern Bessarabia lakes is also demonstrated by the information that the customs point of Ovidiopol (situated at Dniester shore) was preferred to the detriment of Maiaki, because it was 'closer by 40 *verste* to the salt extraction sites, thus salt could be exported all year long' (Tomuleț 2012: 215, note 68).

Salt consumption

We are close to the end of our journey with Moldavian salt, namely arriving at the field of household consumption. Somewhat paradoxically, it is precisely the intimacy of home that prevented writing detailed records concerning this stage of the salt road. We will present here as much as we have learned thus far.

Prices

We know more things about the price paid for this product primarily during the 18th century. Some types of sources, such as the treasury *sămi* (State income and expenditure registers) of this century, outline briefly the expenses made for food from the State budget, for the stays of high Ottoman dignitaries on the Moldavian territory, in their way from and to the regions directly dominated by the Porte in northern and eastern Moldavia (Hotin and Bender counties). In the spring of 1764, the meals of such a pasha and of his retinue required the purchase of salt twice: five *ocale* the first time and three *ocale* the second time, for three *bani* per *oca* (in comparison, one *oca* of sugar cost 240 *bani*, while one *oca* of onion cost six *bani*) (Caproşu 2010a: 302-3). The same price per *oca* of salt was paid 12 years later under the same circumstances (when an Ottoman dignitary was passing through Moldavia) (Caproşu 2010a: 520, 523). However, we should mention that for such a stay of the suite, large amounts of salt were bought – 91 *ocale*. Nonetheless, there were two salt qualities, thus two different prices: three *bani* per *ocă* and six *bani* per *ocă*, meaning twice as much (Caproşu 2010a: 526). Salt was even more expensive in the winter of 1785 (we do not know the place of purchase): to supply certain Ottoman troops, 125 *ocale* were bought, for more than seven *bani* per *ocă* (Caproşu 2010a: 586).

Otherwise, salt was still bought for three *bani* per *ocă* (Caproşu 2010b: 58-60), with some exceptions: while staying at Şişcani (in the county of Orhei), an Ottoman dignitary bought salt for twice this amount: six *bani* per *ocă* (Caproşu 2010b: 41-52). Moreover, also in southern Bessarabia, salt was bought for four *bani* per *ocă* in the spring of 1785 (Caproşu 2010b: 55-57); the same price was paid in the summer of the subsequent year for the supply of Ottoman troops stationed in the Ottoman provinces on Dniester (Caproşu 2010b: 129, 195). In the same summer, low quality salt was bought for people hired to repair the road from the Danube to Iaşi (Caproşu 2010b: 160).

Later, during the war (30 September 1807), the wife of the former prince Constantin Ipsilanti headed towards the north of the country, and on the road she bought salt for her entourage for 12 *bani* per *ocă* (Caproşu 2011: 119). Earlier, in April, for the bread and bread crumbs necessary for the soldiers garrisoned in Moldavia, a great amount of salt had been bought for nine *bani* per *ocă*, just like the salt bought in July 1808 for the Ottoman fleet of the Black Sea (Caproşu 2011: 157; 222). Also for the supply of Ottoman troops, in August 1807, salt was bought for 7.5 *bani* per *ocă* at Tecuci, in the south of the country. In December 1806 and January 1807, salt was bought for 12 *bani* per *ocă* for the Russian soldiers within one of the military hospitals in Iaşi, just as in the county of Putna in the same period, also for a military hospital. Meanwhile, in Bârlad they paid only six *bani* per *ocă* of salt, and the list can go on, prices ranging between six and 12 *bani* per *oca* of salt, depending on the Moldavian region where it was bought (Caproşu 2011: 176; 186; 203-207; 220; 222); the most common price was nine *bani* per *ocă*.

For personal use, the inhabitants paid two *lei* per one hundred *ocale*, at least in early 19th century (Bulat 1938: 123), when out of the 17-18,000,000 *ocale*, 6-7 million were for domestic consumption (Bulat 1938: 124). This was probably the price at the salt store of Târgu Ocna, considered too low to make great profit; hence, one could not sell to villagers more than 100 *ocale*; for greater amounts, they were sent to the stores of the leaseholder at Urecheşti (south from Târgu Ocna), where the price was more approachable (Furnică 1908: 250). The price of doi *lei* per one hundred *ocale* had been established by Alexandru Moruzi in 1793, for those who bought salt from the mine using wagons and who were not allowed to sell it again afterwards (Bulat 1938: 124-125). In 1810, salt from southern Bessarabia lakes cost four *parale* per *chila* (1 *chilă* = 240 *ocale*). Inhabitants on the other side of Dniester paid 1 *leu* per wagon, considering that one wagon weighed 10 *chile*. Harvested in 'good' years, salt could then be sold during rainy years even for 60 *parale* per *chila* (Bulat 1938: 126-127).

Cheap or expensive, salt was brought to households and kept in dry places, such as the 'princely cellar' within the prince's court (Istrati 2008b: 126). In households, salt

was indispensable for various activities, first for diet, as a preservative (for salted cheese, pickles, cured meat) (Ciobanu 2005: 123). We will provide only one example here: coleslaw 'preserved in brine' (pickled cabbage), which stirred the interest of a foreign traveller to the Romanian territory in the 17th century (*Călători* 1976: 58).

At the table, salt was presented, just like today, in saltcellars. A guest of the inhabitants in the region of Hotin, who arrived there around 1582, sat at a table where there was a saltcellar, bread and the spoons (*Călători* 2011: 79). The wealth inventory of a former Moldavian prince – Petru Şchiopul, arrived on German soil – drafted after 1 July 1594 in Bozen, includes two saltcellars, an old one 'with its hook' and a gilded one (*DRH* 2014b: 147). Silver saltcellars and rather expensive ones were available: on 14 March 1763, two such saltcellars were given by the prince to a Turkish dignitary (Caproşu 2010a: 184) or included in the dowry of a boyar's daughter (Caproşu 2004: 280). Common saltcellars were made of lead, such as the one mentioned in the inventory of a store of Iaşi in 1740 (Caproşu 2001a: 307). For an unpaid debt, a merchant gave as warranty various items within his store, two saltcellars included, 'one of *castor* (?), another one of marble' (Caproşu 2007b: 394).

We also wish to mention one of the many (probable) events reflecting the customs and morals of the Levant, which are intriguing and sometimes rather gruesome. Not long after the mid17th century, a fight between Ottomans and Christians in the area of the Orhei Plains ended with the latter defeated. Prisoners were forced to skin the severed heads of the dead, 'which were then sprinkled with salt' and sent to Istanbul (*Călători* 1976: 421). Salt had preservative properties, right?

Salt and animal nutrition

The nutrition of livestock had to include salt, to compensate for the lack of it in the grass. This habit has been preserved since time immemorial: in rural areas, people always sprinkle salt on fodder (Alexianu *et al.* 2007: 26). The amount of salt necessary for animal husbandry is different from one species to another, and it depends on age and weight: on average, the intake of bovines is 25-30g per day, of horses 20-40g, while of sheep 5-15g (Ciobanu 2005: 122). This is why salt seems an indispensable item for any Romanian household, whether it belonged to boyars or to monasteries or common people. Foreign travellers do not forget to mention these details when they encounter them, such as the Frenchmen Jean-Louis Carra. He noted, in 1770 Moldavia, that cattle and horses remained in the fields in winter and summer, from where they were directed from time to time towards the fodder and to 'lick mineral salt' (*Călători* 2000: 248). Around 1788, a physician and naturalist travelling through Bukovina passed near several salt springs at Jicov, Bahna and Runc, but they were 'a little too inconsistent' to stir the interest of Austrian authorities; thus, they were made available for the population 'to be used for cattle and other household needs' (*Călători* 2001: 817).

A special category of historical sources of the 18th century is represented by the registries drafted at the courts of great boyars of the period, which recorded rigorously various aspects related to the good management of such households. Concerning animal husbandry (which involved large herds for such farms) the registers mention – besides fodders – the exact amount of salt necessary.

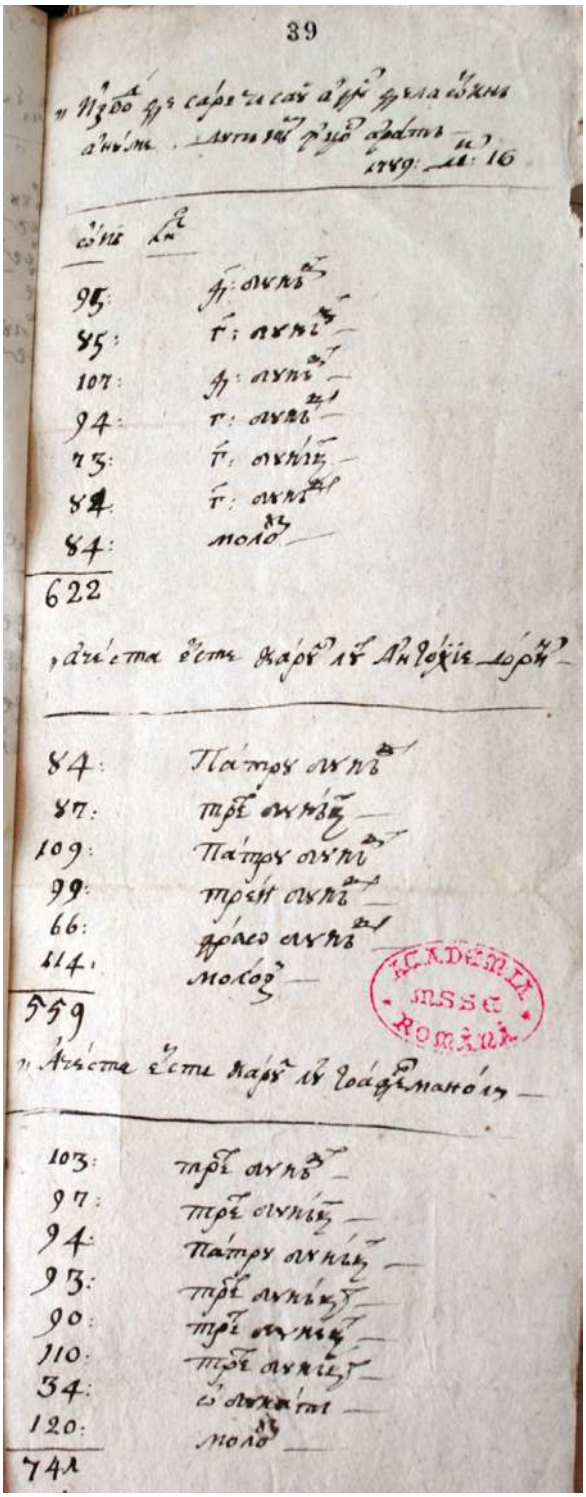
We will give as an example only two lists, excerpted from the registers of the noble Conachi family; the first list is 'an account of the salt brought from the mine, as detailed below. 1789 December 16' (BAR Ms. A2979: f. 39r.) (Figure 10. a – b).

Hence, a calculation made in mid-December 1789 shows that they had bought 2442.8kg of salt, 404kg of which was ground salt (*moloz*) transported in bags. The rest of the salt was brought there as 56 large mineral boulders, weighing 36.4kg on average. The entire amount had been loaded in three wagons, thus each transporting 814kg on average.

The money paid for the salt is comprised in the second list of the register: 'Account of money paid for salt' (BAR Ms. A2979: f. 39v.) (Figure 11. a – b).

Salt and crafts

The crafts of the period also required the use of salt during the manufacturing process, such as raw skin processing, (salt helped preserve their elasticity) (Ciobanu 2005: 124). Sources are discrete on this matter and they do not provide 'technical' details on the manufacturing process. In exchange, there are records regarding a product of what we would classify as a 'food industry' today: the production of salted fish and cured meat. Fish was important merchandise on the domestic market and it was also massively exported. In 1740 and 1742, the merchants of Roman had problems with their Turkish peers who sold this product in the market, though they were only allowed wholesales (Istrati 2008a: 39-40). A document dated 1748–1749 mentioned 'the *prospătaş* and *sărătaş* fisherman', meaning the one who sold fresh fish and salted fish (Caproşu 2001b: 353). Salted fish from the Danube was exported to Poland by Armenian merchants using wagons; these merchants paid customs charge in Cernăuţi by the size of wagons (with two, four or six oxen) (Caproşu 2004: 342). Concerning cured meat, a report drafted on 11



a

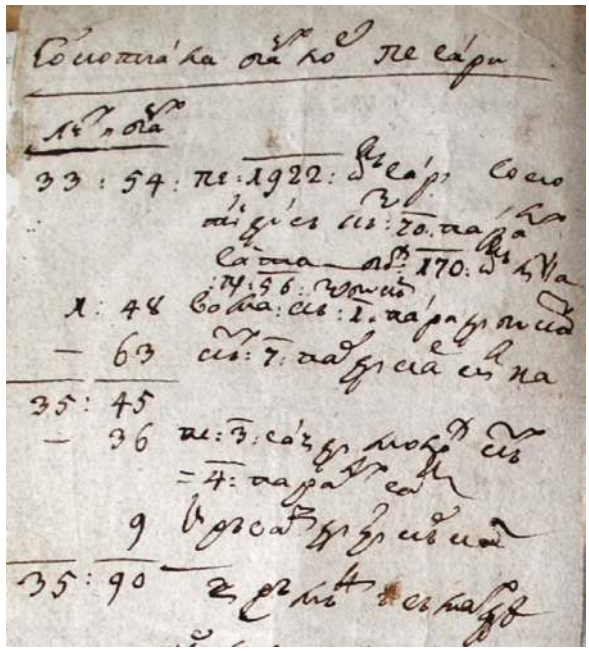
ocă	*litr(e)*	
95	-	4 pieces [of salt]
85	-	3 pieces
107	-	4 pieces
94	-	3 pieces
73	-	3 pieces
84	-	3 pieces
84	-	bulk salt
622		This is the cart of Antohie Dorin
84	-	four pieces
87	-	three pieces
109	-	four pieces
99	-	three pieces
66	-	two pieces
114	-	bulk salt
559		This is the cart of Toader Manoli
103	-	three pieces
97	-	three pieces
94	-	four pieces
93	-	three pieces
90	-	three pieces
110	-	three pieces
34	-	one piece
120	-	bulk salt
741		This the cart of Ioniţe Tiron
622		
559	84	
741	114	
1922	120	2092
318	318	1922
		170
1604	without bulk salt remain in 56 pieces left	

b

Figure 10. Account of the salt brought from the mine (16 December 1789). a – Facsimile; b – Text (BAR Ms. A2979: f. 39r.).

June 1798 by the vice-consul of France in Iaşi, called Parrant, mentioned that in Galaţi it was produced on a large scale, that it had high quality and a good price. He added that the French marines should consider it for supplies, all the more as in 1760 or so, they talked about the arrival of experienced curers ('des saleurs expérimentés') there (Hurmuzaki 1885: 185). Finally, for the gourmands we will mention the pretzels sprinkled with salt, ordered in 1807 by a gourmand from an acquaintance of his (Furnică 1908: 252).

Salt was also a central element in folk rites and beliefs. The methodology of this paper – based on written records – prevents us from providing further details,



a

lei	*bani*	
33	54	for 1922 *ocă* of salt, counting 70 *parale* each hundred [of *ocale*], without 170 *ocă* missing
1	48	custom duties for 56 pieces, 1 *para* each
-	63	7 *parale* for each cart chilna [?]
35	45	
-	36	for 3 sacks of bulk salt, 4 *parale* each sack
-	9	to loud [the carts]
35	90	9 *lei* 30 *bani* remain to pay up to fulfillment of 45 *lei* that they took

b

Figure 11. Account of money paid for salt (16 December 1789). a – Facsimile; b – Text (BAR Ms. A2979: f. 39v.).

because such analysis requires the instruments of folklore specialists and ethnoarchaeologists (Alexianu *et al.* 2007: 123-127). However, we have to note the use of salt in various folk rituals, based on its symbolic value, as a purifying element. Thus, salt was used in foreseeing rituals (folk weather forecasting), in rituals for learning one's destiny or for finding out the gender of an unborn child. Because of its apotropaic valences, salt protects and purifies humans and animals alike (against diseases and spells), as well as dwellings. Salt has healing powers; it is often used in rites pertaining to folk medicine, but it can also be used in black magic. Overall, salt accompanies man in the rituals marking his life, from birth and wedding until death (Avram 2005: 241-242; Ciobanu 2005: 123-124).

We end this paper with an *in extremis* example of folk medicine, since we have mentioned it. We believe the products below are actually pharmaceutical products, not common types of salt. In any case, we note here – at least for their exotic note – the 'salt of Engletera' and the 'salt of Apsanthia', which were included in the composition of a medical prescription against ague at the end of the 18th century (Caproşu and Chiaburu 2008b: 572).

This would be the brief story of Moldavian medieval salt. The topic per se is too complex; hence, we only proposed to outline the grounds of what could be a research monograph, which would also involve the use of other types of sources (archaeological, ethnoarchaeological and ethnofolkloric) and the mandatory use of the comparative method.

References

Alexandrescu-Dresca Bulgaru, M. M. and Mehmet M. A. 1976. *Călători străini despre Ţările Române* VI. Bucureşti, Editura Ştiinţifică şi Enciclopedică.

Alexianu, M., Weller, O. and Brigand, R. 2007. *Izvoarele de apă sărată din Moldova subcarpatică. Cercetări etnoarheologice*. Iaşi, Casa Editorială Demiurg.

Andreescu, Ş., Andreescu, M., Ciocîltan, A., Căzan, I., Pienaru, N., Cristea, O. and Cojocaru, T. 2011. *Călători străini despre Ţările Române*, I. Bucureşti, Editura Academiei Române.

Apetrei, C. N. 2014. Exploatarea sării la Târgu Ocna în epoca modernă timpurie. Constante ale activităţii şi estimări cantitative. In L. Rădvan (ed.), *Oraşe vechi, oraşe noi în spaţiul românesc. Societate, economie şi civilizaţie urbană în prag de modernitate (sec. XVI – jumătatea sec. XIX)*: 55-78. Iaşi, Editura Universităţii 'Alexandru Ioan Cuza'.

Arbure, Z. C. 1898. *Basarabia în secolul XIX*. Bucureşti, Institutul de Arte Grafice Carol Göbl.

Avram, S. 2005. Sarea – tradiţie, simbol şi ritual. *Angustia. Arheologie şi Etnografie* 9: 241-244.

Axinte Uricariul 1994. *Cronica paralelă a Ţării Româneşti şi a Moldovei* II, G., Ştrempel (ed.). Bucureşti, Editura Minerva.

Balan, T. 2005. *Documente bucovinene*, Vol. VII (1464-1740), I. Caproşu (ed.). Iaşi, Editura Taida.

Balan, T. 2006. *Documente bucovinene*, Vol. VIII (1741-1799), I. Caproşu (ed.). Iaşi, Editura Taida.

Bandini, M. 2006. *Codex. Vizitarea generală a tuturor Bisericilor Catolice de rit roman din Provincia Moldova, 1646-1648*, T. Diaconescu (ed.). Iaşi, Editura Presa Bună.

BAR XXXV/69. Biblioteca Academiei Române, Documente istorice, XXXV/69.
BAR LXIV/16. Biblioteca Academiei Române, Documente istorice, LXIV/16.
BAR CLXI/131. Biblioteca Academiei Române, Documente istorice, CLXI/131.
BAR CLXII/229a. Biblioteca Academiei Române, Documente istorice, CLXII/229a.
BAR Ms A2979. Biblioteca Academiei Române, Manuscrise româneşti, nr. A.2979.
Broşteanu, C. 1901. *Salinele noastre. Studiu istoric, juridic şi economic asupra exploatărei salinelor şi monopolului sărei la romani şi români (753 a. Crist. – 1900 d. Crist.)*. Bucureşti, Tipografia G. A. Lăzăreanu.
Bulat, T. G. 1938. Ocnele de sare din Moldova. Organizaţie şi producţia lor în 1810. *Arhivele Basarabiei* X: 121-127.
Bulat, T. G. 1939. *Documentele mănăstirii Văratec (1497-1836)*. Chişinău, Tiparul Românesc.
Burada, T. T. 1885. Despre crestăturile şalgăilor pe droburile de sare. *Revista pentru istorie, archeologie şi filologie III* V, 1: 173-175.
Cantemir, D. 1973. *Descrierea Moldovei*, Gh. Guţu (ed.). Bucureşti, Editura Academiei R. S. R.
Caproşu, I. (ed.) 2000a. *Documente privitoare la istoria oraşului Iaşi* II (1661-1690). Iaşi, Editura Dosoftei.
Caproşu, I. (ed.) 2000b. *Documente privitoare la istoria oraşului Iaşi* III (1691-1725). Iaşi, Editura Dosoftei.
Caproşu, I. (ed.) 2001a. *Documente privitoare la istoria oraşului Iaşi* IV (1726-1740). Iaşi, Editura Dosoftei.
Caproşu, I. (ed.) 2001b. *Documente privitoare la istoria oraşului Iaşi* V (1741-1755). Iaşi, Editura Dosoftei.
Caproşu, I. (ed.) 2004. *Documente privitoare la istoria oraşului Iaşi*, VI (1756-1770). Iaşi, Editura Dosoftei.
Caproşu, I. (ed.) 2005. *Documente privitoare la istoria oraşului Iaşi*, VII (1771-1780). Iaşi, Editura Dosoftei.
Caproşu, I. (ed.) 2006. *Documente privitoare la istoria oraşului Iaşi*, VIII (1781-1790). Iaşi, Editura Dosoftei.
Caproşu, I. (ed.) 2007a. *Documente privitoare la istoria oraşului Iaşi*, IX (1791-1795). Iaşi, Editura Dosoftei.
Caproşu, I. (ed.) 2007b. *Documente privitoare la istoria oraşului Iaşi*, X (1796-1800). Iaşi, Editura Dosoftei.
Caproşu, I. (ed.) 2010a. *Sămile Vistieriei Ţării Moldovei* I (1763-1784). Iaşi, Casa Editorială Demiurg.
Caproşu, I. (ed.) 2010b. *Sămile Vistieriei Ţării Moldovei* II (1786-1798). Iaşi, Casa Editorială Demiurg.
Caproşu, I. (ed.) 2011. *Sămile Vistieriei Ţării Moldovei* III (1805-1826). Iaşi, Casa Editorială Demiurg.
Caproşu, I. (ed.) 2014a. *Documenta Romaniae Historica*, A. Moldova VIII (1585-1592). Bucureşti, Editura Academiei Române.
Caproşu, I. and Chiaburu E. (eds.) 2008a. Însemnări de pe manuscrise şi cărţi vechi din Ţara Moldovei I (1429-1750). Iaşi, Casa Editorială Demiurg.
Caproşu, I. and Chiaburu E. (eds.) 2008b. Însemnări de pe manuscrise şi cărţi vechi din Ţara Moldovei II (1751-1795). Iaşi, Casa Editorială Demiurg.
Caproşu, I. and Ungureanu, M.-R. (eds.) 1997a. *Documente statistice privitoare la oraşul Iaşi* I (1755-1820). Iaşi, Editura Universităţii 'Alexandru Ioan Cuza'.
Caproşu, I. and Ungureanu, M.-R. (eds.) 1997b. *Documente statistice privitoare la oraşul Iaşi* II (1824-1828). Iaşi, Editura Universităţii 'Alexandru Ioan Cuza'.
Caproşu, I. and Zahariuc, P. (eds.) 1999. *Documente privitoare la istoria oraşului Iaşi* I (1408-1660). Iaşi, Editura Dosoftei.
Ceauşu, M. Şt. 1982. Contribuţii la istoricul exploatării sării la sfârşitul secolului al XVIII-lea şi în prima jumătate a secolului al XIX-lea în Bucovina. *Suceava. Anuarul Muzeului Judeţean* IX: 377-392.
Chelcu, M. 2006. Drumuri şi oraşe în Moldova secolelor XVI-XVIII. Câteva observaţii. In L. Rădvan (ed.), *Civilizația urbană din spațiul românesc în secolele XVI-XVIII. Studii şi documente*: 145-170. Iaşi, Editura Universităţii 'Alexandru Ioan Cuza'.
Cihodaru, C. 1984. *Alexandru cel Bun (23 aprilie 1399 – 1 ianuarie 1432)*. Iaşi, Editura Junimea.
Cihodaru, C., Caproșu, I. and Șimanschi, L. (eds.) 1971. *Documenta Romaniae Historica*, A. Moldova, XXI (1632-1633). Bucureşti, Editura Academiei R.S.R.
Cihodaru, C., Caproșu, I. and Șimanschi, L. (eds.) 1975. *Documenta Romaniae Historica*, A. Moldova I (1384-1448). Bucureşti, Editura Academiei R.S.R.
Cihodaru, C., Caproșu, I. And Ciocan, N. (eds.) 1980. *Documenta Romaniae Historica*, A. Moldova III (1487-1504), Bucureşti, Editura Academiei R.S.R.
Ciobanu, D. 2005. Sarea în viaţa cotidiană. *Cumidava* XXVIII: 122-129.
Ciorănescu, A. 2002. *Dicţionarul etimologic al limbii române*, T. Ş. Mehedinţi and M. P. Marin (eds.). Bucureşti, Editura Saeculum I. O.
Ciubotaru M., Grigoruţă, S. and Văcaru, S. (eds) 2013. *Catagrafiile Vistieriei Moldovei (1820-1845). IV. Ţinutul Bacău. Partea 1 (1820)*. Iaşi, Casa Editorială Demiurg Plus.
Ciubotaru, M. and Dănilă, N. (eds) 2014. *Catagrafiile Vistieriei Moldovei (1820-1845). VIII. Ţinutul Putna. Partea 1 (1820)*. Iaşi, Casa Editorială Demiurg Plus.
Codrescu, T. 1889. *Uricariul* II. Iaşi, Tipografia Buciumului Român.
Constantine Porphyrogenitus 1967. *De administrando imperio*, G. Moravcsik and R. J. H. Jenkins (eds.). Washington, D. C., Dumbarton Oaks Center for Byzantine Studies.
Costin, M. 1958. *Opere*, P. P. Panaitescu (ed.). Bucureşti, Editura de Stat pentru Literatură şi Artă.
Dani, I., Gundisch, K., Pervain, V., Răduțiu, A., Rusu, A. and Andea, S. (eds) 1994. *Documenta Romaniae Historica*, C. Transilvania, XIII (1366-1370). Bucureşti, Editura Academiei Române.
Dmitriev, P.G. and Sovetov, P.V. (eds.) 1975. *Moldova în epoca feudalizmului VII, II, Recensămintele populaţiei Moldovei din anii 1772-1773 şi 1774*. Chişinău, Editura Ştiinţa.

Donat, I. and Papacostea, Ş. 2015. Ţinuturile dintre Carpaţi şi Siret într-o descriere austriacă de la sfârşitul secolului al XVIII-lea. Brăila, Muzeul Brăilei 'Carol I', Editura Istros.

Dragnev, D., Svetlicinâi, L., Candu, T., Ciobanu, T. and Constantinov, V. (eds) 2016. *Documente privitoare la istoria Ţării Moldovei în perioada războiului ruso-turc, 1806-1812 I, November 1806 – July 1808*. Chişinău, Editura Tehnica-Info.

Dudnicenco, N. 2009. Extragerea şi comercializarea sării de bucătărie în Ţara Moldovei (sec. XV-XVIII). *Buletin Ştiinţific. Revistă de Etnografie, Ştiinţe ale Naturii şi Muzeologie*, New series, Branch Ethnography and Museology 11, 24: 205-215.

Filitti, G., Marinescu, B., Rădulescu-Zoner, Ş., and Stroia, M. 2004. *Călători străini despre Ţările Române în secolul al XIX-lea*, New series, I (1801-1821). Bucureşti, Editura Academiei Române.

Furnică, D. Z. 1908. *Din istoria comerţului la români mai ales băcănia*. Bucureşti, Atelierele Grafice Socec & Co.

Furnică, D. Z. 1931. *Documente privitoare la comerţul românesc, 1473-1868*. Bucureşti, Tipografia România Nouă.

Giurescu, C. C. 1997. *Târguri sau oraşe şi cetăţi moldovene din secolul al X-lea până la mijlocul secolului al XVI-lea*. Bucureşti, Editura Enciclopedică.

Gonţa, A. I. 1989. *Legăturile economice dintre Moldova şi Transilvania în secolele XIII-XVII*, I. Caproşu (ed.). Bucureşti, Editura Ştiinţifică şi Enciclopedică.

Holban, M. (ed.) 1968. *Călători străini despre Ţările Române* I. Bucureşti, Editura Ştiinţifică.

Holban, M. 1973. *Călători străini despre Ţările Române* V, M. Holban, M. M. Alexandrescu Dersca Bulgaru and P. Cernovodeanu (eds.). Bucureşti, Editura Ştiinţifică.

Holban, M., Alexandrescu-Dersca Bulgaru, M. M., and Cernovodeanu, P. (eds.) 1983. *Călători străini despre Ţările Române* VIII. Bucureşti, Editura Ştiinţifică şi Enciclopedică.

Holban, M., Alexandrescu-Dersca Bulgaru, M. M., and Cernovodeanu, P. (eds.) 1997. *Călători străini despre Ţările Române* IX. Bucureşti, Editura Academiei Române.

Holban, M., Alexandrescu-Dersca Bulgaru, M. M., and Cernovodeanu, P. (eds.) 2000. *Călători străini despre Ţările Române* X, I. Bucureşti, Editura Academiei Române.

Holban, M., Alexandrescu-Dersca Bulgaru, M. M., and Cernovodeanu, P. (eds.) 2001. *Călători străini despre Ţările Române* X, II. Bucureşti, Editura Academiei Române.

Hurmuzaki 1885. *Documente privitoare la istoria românilor, urmare la colecţiunea lui Eudoxiu de Hurmuzaki* I, II (1781-1814), A. I. Odobescu (ed.). Bucureşti, Atelierele Grafice Socec & Comp.

Ichim, D. 2006. Exploatarea sării în Moldova medievală. In V. Cavruc and A. Chiricescu (eds), *Sarea, Timpul şi Omul*: 125-131. Sfântu Gheorghe, Editura Angustia.

Iorga, N. 1906. *Studii şi documente cu privire la istoria românilor*, XI. Bucureşti, Atelierele Grafice Socec & Comp.

Iorga, N. 1914. Histoire des juifs en Roumanie. *Académie Roumaine. Bulletin de la Section Historique* II, 1: 33-81.

Isac, V. (ed.) 1989. *Catalog de documente din Arhivele Statului Iaşi. Moldova*, I (1398-1595). Bucureşti, Direcţia Generală a Arhivelor Statului.

Istrati, C. (ed.) 2008a. *Condica lui Constantin Mavrocordat*, II. Iaşi, Editura Universităţii 'Alexandru Ioan Cuza'.

Istrati, C. (ed.) 2008b. *Condica lui Constantin Mavrocordat*, III. Iaşi, Editura Universităţii 'Alexandru Ioan Cuza'.

Istrati, C. (ed.) 2010. *Condica Vistieriei Moldovei din anul 1803*. Iaşi, Editura Universităţii 'Alexandru Ioan Cuza'.

Maxim, M. 2008-2009. Trei noi documente turceşti despre relaţiile româno-otomane la sfârşitul secolului al XVI-lea. *Acta Moldaviae Septentrionalis* VII-VIII: 99-116.

MDG 1898. *Marele dicţionar geografic al României*, Vol. I. Bucureşti, Stabilimentul Grafic J. V. Socec.

MDG 1901. *Marele dicţionar geografic al României*, Vol. IV. Bucureşti, Stabilimentul Grafic J. V. Socec.

Murariu, I. 1999. O 'fabrică' de sare huscă în satul Luncani din ţinutul Bacău în anul 1817. *Carpica* XXVIII: 219-222.

Neculce, I. 1982. *Opere,* G. Ştrempel (ed.). Bucureşti, Editura Minerva.

Popp, M. N. 1938. Drumuri şi ocupaţiuni vechi în Ţările Româneşti. *Buletinul Societăţii Române de Geografie* 57: 271-287.

Rădvan, L. 2011. *Oraşele din Ţările Române în Evul Mediu (sfârşitul sec. al XIII-lea – începutul sec. al XVI-lea)*. Iaşi, Editura Universităţii 'Alexandru Ioan Cuza'.

Regleanu, M., Duca, D., Negulescu, C., Vasilescu, V. and Crivăţ, C. 1968. *Catalogul documentelor moldoveneşti din Arhiva Istorică Centrală a Statului*, III (1653-1675). Bucureşti, Direcţia Generală a Arhivelor Statului.

Șimanschi, L., Ciocan, N., Ignat, G. and Agache, D. (eds.) 1996. *Documenta Romaniae Historica*, A. Moldova XXIII (1635-1636). Bucureşti, Editura Academiei Române.

Șimanschi, L., Ignat, G. and Agache, D. (eds.) 1976. *Documenta Romaniae Historica*, A. Moldova II (1449-1486), Editura Academiei R.S.R..

Tomuleţ, V. 2012. *Basarabia în sistemul economic şi politic al Imperiului Rus (1812-1868)*. Chişinău, Editura Cartdidact.

Vitcu, D. 1987. *Istoria salinelor Moldovei în epoca modernă*. Iaşi, Universitatea 'Alexandru Ioan Cuza'.

Zahariuc, P., Chelcu, C., Chelcu, M., Văcaru, S., Ciocan, N. and Ciurea, D. (eds.) 2005. *Documenta Romaniae Historica*, A. Moldova, XXVII (1643-1644). Bucureşti, Editura Academiei Române.

Zahariuc, P., Chelcu, C., Chelcu, M., Văcaru, S. and Grigoruță, S. (eds.) 2014b. *Documenta Romaniae Historica*, A. Moldova IX (1593-1598). Bucureşti, Editura Academiei Române.

A Less Known Practice: Making Salt Cakes in Wooden Vessels. The Testimony of a Foreign Traveller to Moldavia

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Abstract

The authors discuss the topic of salt crystallization performed traditionally by analyzing a documentary source of the eighteenth century. This is an excerpt of the work written by Balthasar Hacquet (1790), who described a little known procedure, namely salt briquetage in wooden vessels. This practice was mentioned by the aforecited author in the sub-mountainous area of the modern county of Suceava; there, by boiling brine and using wooden moulds, they obtained standard salt cakes. Taking into account the importance of this ethnographic information and its rarity, we believe we are able to unravel additional information concerning the technique of salt briquetage for ancient periods, too.

Keywords: Salt crystallization, briquetage, wooden vessels, Balthasar Hacquet, Moldavia, ethnography.

Introduction

Across history, the need to obtain salt led people to find various techniques. The archaeological records, the documentary sources, and the ethnographic data fully confirm this statement, primarily that the exploitation methods were conditioned by the natural salt state (Gouletquer, Weller 2015; Mircea 2003; Mircea, Alexianu 2007; Monah 1991: 390; 2002, 143; Monah, Dumitroaia 2007; Ursulescu 1977: 307-310; Weller 2002). In the case of salt-water sources, there are two different usages: the use of brine per se and its exposure to heat in order to obtain crystallized salt (Alexianu *et al.* 2007).

Starting from the archaeological record discovered in the sites situated near salt-water springs, it has been determined that clay vessels were used for crystallization in certain areas, while in prehistory there were certain pottery types used for obtaining salt cakes, such as *briquetage* (Andronic 1989: fig. 4/5; Dumitroaia 1994: 62; Monah 1991: 390; 2015: 116-117; Preoteasa 2015: 143; Ursulescu 1977: 307-310; Weller 2015: 71-72). Because our paper is related to the area situated east of the Carpathians, we posit that such types of *briquetage*, preserved as fragments, were documented only during the Eneolithic, namely in the Cucuteni culture setting (Dumitroaia 1994: 66, fig. 49, 50; Dumitroaia *et al.* 2015; Monah 2012: 138-139; Nicola *et al.* 2007: 47, fig. 12, 14, 15; Sandu *et al.* 2012). Certainly, salt crystallization by boiling brine required the use of a varied array of pottery vessels. This technique was perpetuated in the modern era, in order to obtain the so-called '*huscă*', but metallic vessels were used to this end (Alexianu *et al.* 2007: 294-296, fig. 10; Alexianu *et al.* 2008: 161-163). Crystallized salt was mainly conditioned by the necessity of distributing/trading the mineral in areas lacking this resource (Alexianu and Weller 2007: 312-314, fig. 3).

The currently available ethnographic data provide references to the manner and locations where '*husca*' is obtained, but there is no information related to salt briquetage in specialized vessels. The study of the records written by a foreign traveller – Balthasar Hacquet – concerning eighteenth-century Moldavia brought attention upon the use of special wooden vessels in order to obtain salt cakes. Such a method – used in historical times until recently – provides valuable indicators that can be extrapolated for prehistory or Antiquity.

Who was Balthasar Hacquet?

Descendent of a French family, Balthasar Hacquet (Figure 1) was born in 1739 or, according to other sources, in 1740 (Šumrada 2003).

He studied in Vienna, where he finished his higher education studies in 1764, but he also took part in the Seven Years' War (1756–1763). He was a member of several European academies of sciences and he was considered a true representative of the Enlightenment. He served as a professor at the universities of Ljubljana, Lviv and Krakow. Balthasar Hacquet was an encyclopaedic spirit, with solid knowledge of mineralogy, geology, botany, zoology, but he also excelled as a military expert, historian, naturalist, ethnographer, sociologist, and expert in cultural and political studies. He spoke German, English, Latin, French, and he also knew some Slavic languages, which enabled him to follow closely the rich scientific literature necessary for his research work (Kril 2003: 49-50).

Figure 1. Balthasar Hacquet (1739/1740-1815).

In the period 1763-1764, he lived in Transylvania, probably as a physician, while in 1788 and 1789 he travelled to Moldavia. He died on the 10th of January 1815, in Vienna, but he left behind a complex scientific work (Foreign Travellers 2001: 809-810; Kril 2003).

Among the works published by the aforementioned author, one book is particularly important for our study: *Neueste physikalisch-politische Reisen in den Jahren 1788 und 1789 durch die Dacischen und Sarmatischen oder Nördlichen Karpathen*, published in 1790 in Nürnberg (Figure 2).

The book penned by Hacquet (1790), though highly valuable, has not significantly stirred the interest of specialists in Romania, except for a few, which we mention here. The first references to his journey in the Romanian space are found in Iorga (1929: 19-34). An outline of Hacquet's biography and fragments of the afore-cited work were published in the volumes of documents on foreign travellers in the Romanian principalities (Foreign Traveller 2001: 809-859).

Excerpts from Hacquet's writings on Bukovina were translated into a volume published in the series titled *Enciclopedia Bucovinei în studii şi monografii*, which comprised only three chapters (I, III, IV) of the first part within the book by the author cited above (Hacquet 2002). Furthermore, Boghian (2013) used the references


HACQUET'S
neueſte
phyſikaliſch-politiſche Reiſen
in
den Jahren 1788. und 1789.
durch
die Daciſchen und Sarmatiſchen
oder
Nördlichen Karpathen.
Erſter Theil.
Nürnberg,
im Verlag der Raſpiſchen Buchhandlung.
1790.

Figure 2. The title page of B. Hacquet's book (1790).

on various types of raw materials featured in Hacquet's work in his scientific contribution, in order to provide several data on the possible sources exploited by the prehistoric communities and by the subsequent ones, situated in the north of Romania.

Through its geographic, historical and ethnographic data, Hacquet's work is a principle reference for the realities of Romania of the eighteenth-century.

An ethnographic record on a less known technique

Regarding our current topic, we mention that – in a study reuniting several ethnographic records of certain foreign travellers to the Romanian territory – Simionescu (1971: 296) made reference to a passage in Hacquet's book (1790) which described how salt cakes were obtained in wooden vessels in eighteenth-century Moldavia. Unfortunately, the author of the study failed to publish the entire passage as it was featured in the original book; he even cited the source wrongly. This piece of information was later taken as such and referenced by Luca (2008: 466).

Taking into account the implications of such information, we searched for the primary documentation source, and for which we provide a full translation of the excerpt describing the procedure used for obtaining salt cakes in wooden vessels.

'If you advance from this monastery [Suceviţa – author's note] towards the Pliesa Mountain, which consists of grey sandstone (just like the other mountains in this county), you keep finding such landforms that wild creeks cross from every direction. At the median altitude of these mountains, two salt exploitation pits functioned not long ago: one of them is called *Slatina di la pliesa*, while the other *Slatina di Plossi*. None of the pits – where water is extracted from – is deep, and the salt within is mixed with a bluish clay. Before I arrived there, I had been told in Galicia that halite had been discovered. However, those were dispersed pieces of salt, which had to be initially dissolved in freshwater in order to extract salt. In the vicinity of these two pits, a hut was built for water evaporation. Inside it, I found a rectangular boiler made of sheet metal, which measured by sections a little more than a Lachter [= 1.8 m – author's note] and which was 14-ţoli deep [35.56 cm – author's note]. The boiler was placed at a height of a foot and a half [around 45 cm – author's note] on a wall. In this boiler, brine from the two pits (placed higher than the hut) passed through a conduct, without heating it beforehand. After evaporation, salt was thrown in a trough with an inclination of 30 degrees, so that the remaining water may flow out. Then, a conical wooden mould (that looks like a large beaker) was filled with salt and gently pressed, then turned upside down and left to dry near the fire. This method helps finish the drying process, by also adding brine from time to time. Such a small salt 'flatbread' weighs a pfund and 13 loths [around 650 g – author's note] and 100 such pieces are sold for two guldens. One man who does all the work receives 20 *creiţari* a day, while the person who adds water and directs it receives 12 *creiţari*. Conversely, wood was bought very cheaply from the subjects in the vicinity. This was a limitation that the Office of Salt afforded, but which was now eliminated; thus, salt is, of course, a little more expensive, but it is still a good deal for those who received only three to six *creiţari* for a load of wood and who now receive 30 or even more. This incredibly simple method of obtaining salt by evaporation is probably the first improved method that human beings have used since the beginning of times. We can assume that, from time immemorial, people put brine on hot stone to evaporate water.

Before this part of Moldavia was submitted to the Imperial house, this country knew nothing about obtaining salt by evaporation. Now there are already five such small evaporation instalments and the outcome is highly significant.

If you go towards the east, you reach three other less important salt pits, where you can find only one such small evaporation boiler in each of the three pits: at Slatyory or Slatiora, at Trestiny and at Porteczie. All of these pits, like the first ones, are in the middle of the woods, where workers have access to so much game, that they do not eat anything else throughout the year'[1] (Hacquet 1790: 107-109).

Discussion

A first detail to highlight in the aforementioned text is the name of the two salt sources, which coincides with the modern-day Salt mine of Pleşa, in the commune of Marginea (County of Suceava) (Figure 3), situated on the right bank of the Haşca creek (Weller et al. 2010: 451). Recent investigations have confirmed the exploitation of these sources in the late medieval and the modern period, as well as activities of salt crystallization in their close vicinity (Weller et al. 2010: 452).

It is also very important to point out the information about the existence, in the vicinity of sources, of a small building – a hut – which contained some sort of instalment for salt crystallization. The text shows that it included a rectangular metallic container, leaned against a wall or a stone arrangement, underneath which a fire was made to evaporate water. After obtaining 'husca', it was transferred to a wooden recipient placed in an oblique position in order to favour the draining of the fluid left within that salty mush. The most important passage is the one that features salt being poured into a conical wooden container while still wet, and then taken out and left to dry near the fire, thus obtaining more or less standard salt cakes. Another detail worth underlining is that brine was poured on the cakes from time to time, most probably in order to create a solid crust that would prevent the salt cone from disintegrating. The fact that details are provided concerning the weight and price of these raw salt cakes and the wages for producers is a good argument for the fact that this practice was based on certain rules, probably regulated by the so-called Salt Office. The author of the text also states that this method was practiced in several salt-water springs in the area, but that it had not been applied before.

Unfortunately, the information concerning the wooden moulds where the 'husca' was poured is scarce. Besides its conical shape, there is no data on the manufacturing method, but it may be admitted that such wooden moulds were either carved from a single piece of wood, or made of several pieces, (following the model of wooden pails or small barrels). However, we believe that such 'moulds' may have also been made from tree bark, mostly considering that in the rural setting people used

[1] For the translation from German into Romanian, we thank Eduard Nemeth, PhD.

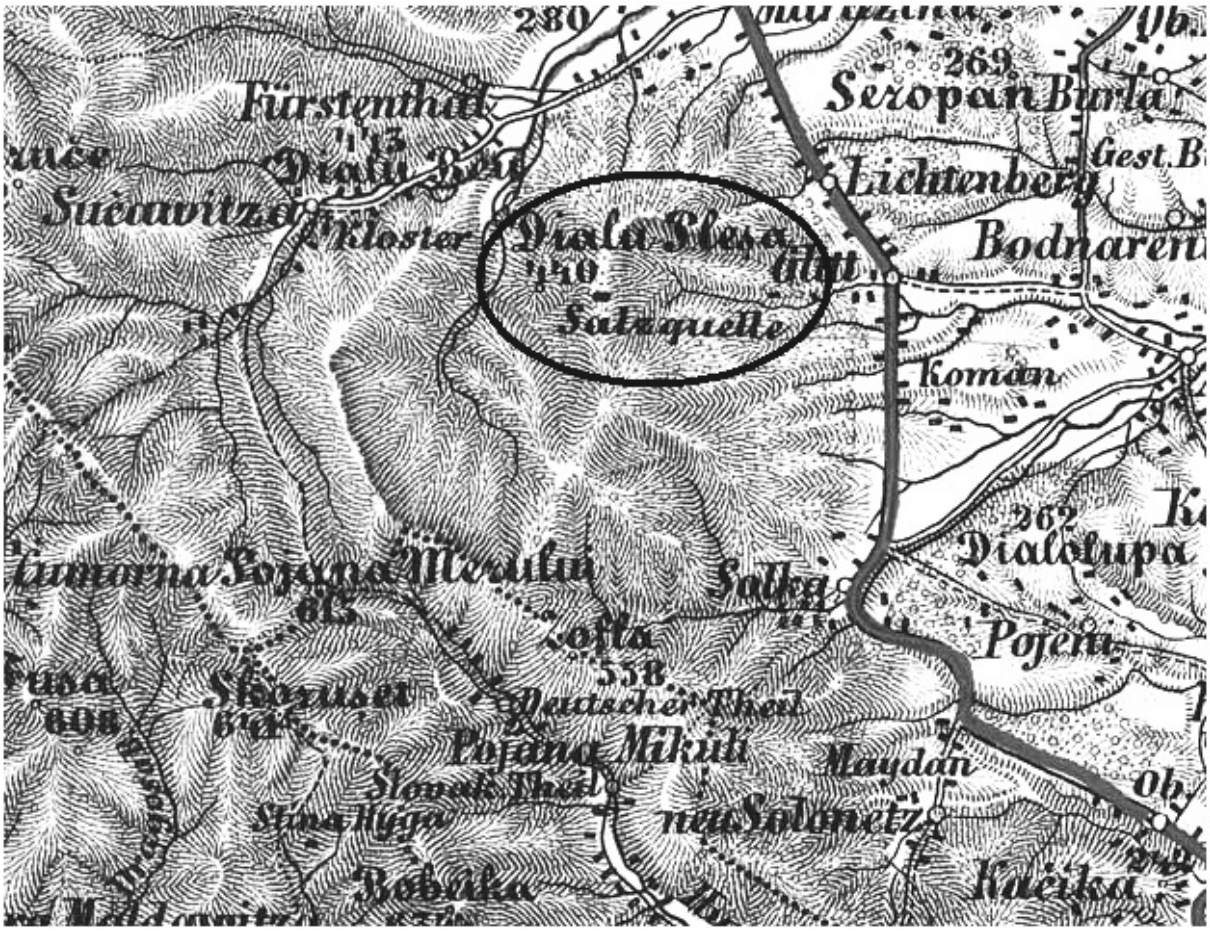

Figure 3 – Localization of salt sources mentioned in the text, after an Austrian map of 1873.

such items for preserving salt (Diaconu, Diaconu 2015, 90-91, fig. 1/5).

Conclusions

The study of historical sources and their corroboration with ethnographic data may provide arguments, additional information or explanations for certain archaic techniques and for salt exploitation, implicitly.

In this paper, we unravelled a little known procedure in modern times – salt briquetage in wooden moulds – which may justify such a method for prehistory, too. It is definitely necessary to conduct a more detailed analysis of this technique, including experimental, in order to test its effectiveness and thus to reassess the functionality and importance of clay briquetage used in ancient times.

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References

Alexianu, M., Weller, O. 2007. Recherches ethnoarchéologiques sur le sel: les enquêtes de 2004 et les premiers résultats obtenus dans la zone de *Poiana Slatinei* à Lunca (dép. Neamţ, Roumanie). In D. Monah, Gh. Dumitroaia, O. Weller, J. Chapman (eds.), *L'exploitation du sel à travers le temps:* 299-318. Bibliotheca Memoria Antiquitatis XVIII. Piatra Neamţ, Constatin Matasă.

Alexianu, M., Weller, O., Brigand, R. 2007. *Izvoarele de apă sărată din Moldova Subcarpatică. Cercetări etnoarheologice*. Iaşi, Casa Editorială Demiurg.

Alexianu, M., Dumitroaia, Gh., Monah, D. 2007. The exploitation of the salt-water in Moldavia: an ethno-archaeological approach. In D. Monah, Gh. Dumitroaia, O. Weller, J. Chapman (eds.), *L'exploitation du sel à travers le temps:* 279-298. Bibliotheca Memoria Antiquitatis XVIII. Piatra Neamţ, Constatin Matasă.

Alexianu, M., Weller, O., Brigand, R., Curcă, R.-G., 2008. Cercetări etnoarheologice asupra izvoarelor de apă

sărată din Moldova subcarpatică. *Tyragetia*, Seria Noua II, XVII: 155-177.

Andronic, M. 1989. Cacica - un nou punct neolitic de exploatare a sării. *Studii şi Cercetări de Istorie Veche şi Arheologie* 40, 2: 171-177.

Boghian, D. 2013. The works of Balthazar Hacquet – sources for the study of the natural resources used by pre-historical and historical communities from the north-eastern Carpathian area. In D. Boghian, B. P. Niculică (eds.), *Semper fidelis. In honorem magistri Mircea Ignat*: 43-64. Suceava. Istros.

Diaconu, R., Diaconu, V. 2015. Wooden Recipients used for Salt. An Ethnographic Approach. In Ş. Caliniuc, M. Asăndulesei, R. G., Curcă, M. T. Alexianu (eds.), *First International Congress on the Anthropology of Salt, 20-24 August 2015, 'Al. I. Cuza' University of Iaşi, Romania, Programme and Abstracts*: 91-92. Iaşi.

Dumitroaia, Gh. 1994. Depunerile neo-eneolitice de la Lunca și Oglinzi, județul Neamț. *Memoria Antiquitatis* XIX: 7-82.

Dumitroaia, Gh., Diaconu, V., Nicola, C. D. 2015. Briquetages in Cucuteni Settlements of Moldavia (Romania). In Ş. Caliniuc, M. Asăndulesei, R. G., Curcă, M. T. Alexianu (eds.), *First International Congress on the Anthropology of Salt, 20-24 August 2015, 'Al. I. Cuza' University of Iaşi, Romania, Programme and Abstracts*: 46-47. Iaşi.

Gouletquer, P., Weller, O. 2015. Techniques of salt making: from China (Yangtze River) to their world context. In R. Brigand, O. Weller (eds.), *Archaeology of salt. Approaching an invisible past*: 13-27. Leiden, Sidestone Press.

Hacquet, B. 1790. *Neueste physikalisch-politische Reisen in den Jahren 1788 und 1789 durch die Dacischen und Sarmatischen oder Nördlichen Karpathen*. Erster Theil, *Nürnberg*.

Hacquet, B. 2002. *Bucovina în prima descriere fizico-politică. Călătorie prin Carpații Dacici (1788-1789)*. Editura Septentrion.

Holban, M., Alexandrescu-Dersca Bulgaru, M. M. and Cernavodeanu, P (eds.) 2001. *Călători străini prin Ţările Române* X, II. Bucureşti, Editura Academiei Române.

Iorga, N. 1929. *Istoria Românilor prin călători* III. Bucureşti. Casa Şcoalelor.

Kril, M. 2003. Balthasar Hacquet as a historian. *Hacquetia* 2, 2: 49-53.

Luca, G. 2008. *Târgu Neamț. Monografie*. Constantin Matasă, Piatra Neamț.

Mircea, M. 2003. O enigmă la gura fluviului Borysthenes – cristalizarea naturală a sării 'în grămezi uriaşe de bulgări'. In E. Sava (ed.), *Interferenţe cultural-cronologice în spaţiul nord-pontic*: 236-251. Chişinău.

Mircea, M., Alexianu, M. 2007. A re-evaluation of salt resources for the Cucuteni-Tripolye area. In D. Monah, Gh. Dumitroaia, O. Weller, J. Chapman (eds.), *L'exploitation du sel à travers le temps*: 199-219. Bibliotheca Memoria Antiquitatis XVIII, Piatra Neamț.

Monah, D.. 1991. L'exploitation du sel dans les Carpates Orientales et ses rapports avec la culture de Cucuteni-Tripolye. In V. Chirica, D. Monah (eds.), *Le Paléolithique et le Néolithique de la Roumanie en context européen* : 387-400. Bibliotheca Archaeologica Iassiensis IV, Iași.

Monah, D. 2002. L'exploitation du sel dans les Carpathes Orientales. In O. Weller (ed.), *Archéologie du sel: techniques et sociétés*: 135-146. Internationale Archäologie, Liège, Rahden/Westfalie.

Monah, D. 2012. L'approvisionnement en sel des tribus chalcolithiques sédentaires et des tribus des steppes du Nord de la mer Noire. In V. Nikolov and K. Backvarov (eds.), *Salz und Gold: die Rolle des Salzes im prähistorischen Europa / Salt and Gold: The Role of Salt in Prehistoric Europe*: 127-141. Provadia-Veliko Tarnovo.

Monah, D. 2015. Salt Springs: Places for Salt Recrystallization and Ritual Centers for Exchange with Steppe Populations. In M. Alexianu, R. G. Curcă and V. Cotiugă (eds.), *Salt Effect. Second Arheoinvest Symposium from the Ethnoarchaeology to the Antrhropology of Salt*: 111-120. British Archaeological Reports, International Series 2760, Oxford, Archaeopress.

Monah, D., Dumitroaia, Gh. 2007. Recherches sur l'exploitation préhistorique du sel en Roumanie. In D. Monah, Gh. Dumitroaia, O. Weller and J. Chapman (eds.), *L'exploitation du sel à travers le temps*: 13-34. Bibliotheca Memoria Antiquitatis XVIII, Piatra Neamț.

Nicola, D., Munteanu, R., Garvăn, D., Preoteasa, C., Dumitroaia, Gh. 2007. Solca – Slatina Mare (Roumanie). Preuves archéologiques de l'exploitation du sel en préhistoire. In D. Monah, Gh. Dumitroaia, O. Weller and J. Chapman (eds.), *L'exploitation du sel à travers le temps*: 35-56. Bibliotheca Memoria Antiquitatis XVIII, Piatra Neamț.

Preoteasa, C. 2015. Salt Exploitation and Valorisation by the Human Communities of the Precucuteni – Cucuteni - Tripolye Cultural Complex. In M. Alexianu, R. G. Curcă and V. Cotiugă (eds.), *Salt Effect Second Arheoinvest Symposium: From the ethnoarchaelogy to the anthropology of salt, 20-21 April 2012, 'Al. I. Cuza' University, Iaşi, Romania*: 135-162. British Archaeological Reports 2760. Oxford, Archaeopress.

Sandu, I., Weller, O., Stumbea, D. and Alexianu, M. 2012. Analyses archéométriques sur le moules à sel chalcolithiques de l'est de la Roumanie. In V. Nikolov and K. Bakvarov (eds.), *Salz und Gold: die Rolle des Salzes im prähistorischen Europa / Salt and Gold: The Role of Salt in Prehistoric Europe*: 143-154. Provadia-Veliko Tarnovo.

Simionescu, P. 1971. Mărturii etnografice - puţin cunoscute - ale unor călători străini în ţările române

(sec. XVII-XVIII). *Revista de Etnografie şi Folclor* 16, 4: 289-299.

Šumrada J. 2003. K vprašanju izvora Balthasarja Hacqueta. *Zgodovinski Časopis* 57, 3-4 (128): 347-361.

Ursulescu, N. 1977. Exploatarea sării din saramură în neoliticul timpuriu, în lumina descoperirilor de la Solca (jud. Suceava). *Studii şi Cercetări de Istorie Veche şi Arheologie* 28, 3: 307-317.

Weller, O. 2002. Aux origines de l'exploitation du sel en Europe. Vestiges, fonctions et enjeux archéologiques. In O. Weller (ed.), *Archéologie du sel: techniques et sociétés:* 163-175. Internationale Archäologie, Liège. Rahden/Westfalie.

Weller, O. 2015. First salt making in Europe: a global overview from Neolithic times. In R. Brigand, O. Weller (eds.), *Archaeology of salt. Approaching an invisible past*: 67-82. Leiden, Sidestone Press.

Weller, O., Brigand, R. and Alexianu, M. 2010. Recherches systématiques autour des sources salées de Moldavie. Bilan des prospections 2008-2010. *Memoria Antiquitatis*, XXV-XXVI (2008-2009): 437-504.

Organization and Functioning of the Salt Extracting Industry in Bessarabia (1812-1850)

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Abstract

In the Russian Empire salt extraction constituted a state monopoly which was strictly regulated by the Salt Law of 1781 (including following complements to it). After the annexation of Bessarabia to the Russian Empire in 1812, it was decided to keep granting salt extraction to concessioners. The Local government set up in 1819 in the province an Administration of Saline Lakes, not provisioned by the general law, and thus limited in powers. Efficient organization of the process of salt extracting by private entrepreneurs determined a high competitiveness of the salt extracted from lakes of the province in terms of price, considering the fact that the salt trade was free of restrictions. Thus, the salt from Bessarabia was able to create a substantial competition to the salt extracted in the Crimea, from which the Russian government levied a very high tax. The Committee of Ministers responded by imposing custom duties on salt exports from Bessarabia to territories lying over the Dniester, and since 1830 took over the whole local industry and wholesale trade with salt. Thus, by ukase of 26 May 1830, Emperor Nicholas I approved the submission of Bessarabian saline lakes to the fully legally established Administration of Saline Lakes and private manufacturers were urged to evacuate the already extracted salt deposited near the lakes. The extraction of salt was afterwards strictly regulated in terms of quantity and price. The salt extraction flourished, but the lack of serious investments, especially required for natural disaster prevention, culminated with the total flooding of the lakes in 1850, which put an end to salt industry in Bessarabia.

Keywords: Bessarabia, Russian Empire, salt extraction craft, state monopoly, salt trade, salt prices.

During Middle Ages, in Moldavia salt extraction was administered by the Saline Chamber, but by the second half of the 18th century, due to abuses of its officers, the salt extraction started to be given in concession (Ichim 2006: 129). At that time, saline lakes from the south-eastern part of Moldavia, in the region called then Bessarabia, but also known as Budjak, were under the control of Turkish rayas of Kilya, Akkerman and Ismail, being owned by Ottoman landlords. According to the surviving sources, salt in these lakes was little or not at all extracted (Гроссул and Будак 1967: 299). Historians who researched the subject, estimated that, at the end of the 18th century – beginning of the 19th century, about 500,000 *poods*[1] of salt were extracted in this territory, which represented about 1/3 of all the salt produced in whole Moldova (Мунтян 1971: 231).

During the Russo-Turkish War of 1806-1812, after the occupation of the Romanian Principalities by Russian troops, the saline lakes of Budjak drew the attention of Tsarist administration. In 1807 due to improvements made by Stratos Kalfa, on his own initiative, the production of salt reached 100,000 *kilas,*[2] but the next two years brought no yield. The lakes were given in concession, and the import of salt from them into Russia was declared duty free. In 1810, concessioners paid Stratos Kalfa to operate new improvements to the salt lakes, dams with floodgates being built on the lakes Khadzhi-Ibraim and Karachaush. As a result, the production of salt reached 200,000 *kilas*, and in the following 1811 and 1812 – 100,000 *kilas* each. In 1810 around 10,000 workers endeavoured at salt extraction, being paid 2.5 lei[3] a day each, and the extraction season lasted four months (Свинин 1818: 182).

Each entrepreneur paid a moderate fee of 4 *para* for every *kila* of extracted salt, 40 *para* per car with a pair of oxen transporting salt out from salt lakes, and 3 *para* for the scribe who kept records. From these taxes were accumulated 25,000 lei in 1810, 15,000 lei in 1811 and 7000 lei in 1812. The cost of a *kila* of salt was 5 lei during this period (Свинин 1818: 184). It must be mentioned that in the early nineteenth-century Russian Empire the salt industry was strictly regulated and taxed in excess by the Law of 1781 (including amendments thereto), (Зябловский 1842: 94), so that the salt industry of Budjak had several advantages compared to other saltworks.

[1] *Pood* (Russian: пуд) is a Russian old unit of mass divided into 40 *funt* (фунт, Russian pound), equal approximately to 16.38 kilograms (36.11 pounds).

[2] *Kila* is an old gill used in Romanian Countries having different values in various places. In archival documents a *kila* of salt in Bessarabia was equated to 18 Russian *poods*.

[3] Leu (*pl.* Lei) – a generic name for silver coins that circulated in Romanian Countries, based on Dutch thaler of the 17th century (Lowenthaler), with a lion on reverse. In this case, these were silver Ottoman coins which divided into 40 *para*, and had an echange rate of 60 copper kopeks.

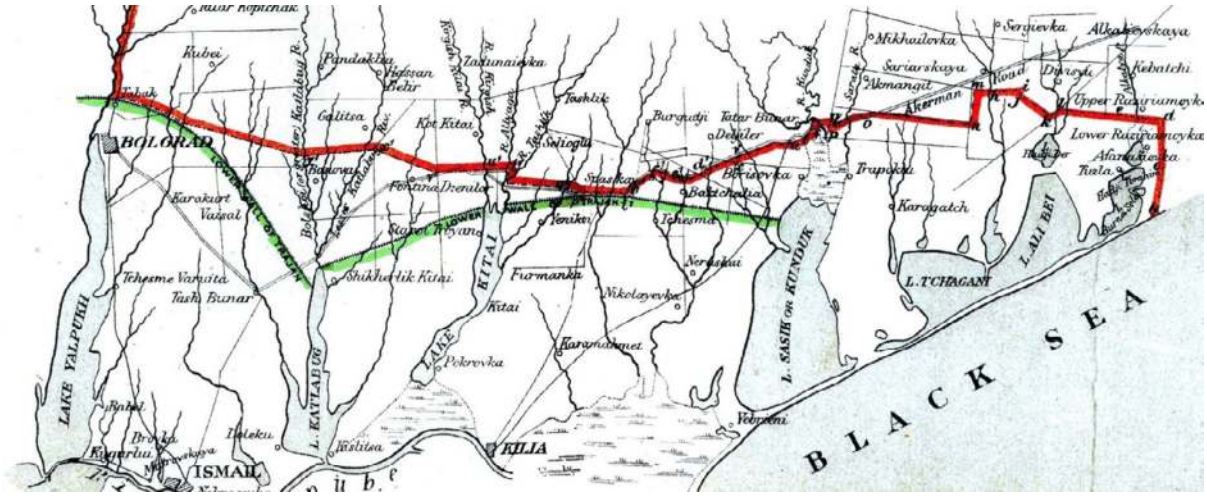

Figure 1. Map of the salt lakes from Southern Bessarabia showing the boundary between Russia and Turkey on the Bessarabian Frontier as fixed by the Treaties of 30th March 1856, 6th January 1857, and 19th June 1857. Harrison & Sons. Lith. St. Martins Lane. Credit: Wikipedia.

As a consequence of the war, by the Treaty of Bucharest of 16/28 May 1812, the territory between Prut and Dniester was annexed to the Russian Empire, and the name 'Bessarabia' was intentionally and improperly extended to its entirety. The Russian government organised ten scientific expeditions to research the existing saline lakes in the southern part of the province, among which were the geologic expedition of academician G.M. Gelmerson, the expedition of Eikhfeld, and the expedition of the Black Sea Admiralty. In 1815 the Russian Government detaches to Bessarabia the traveller, geographer and writer P. P. Svinin, who later published on the pages of Journal *Otechestvennye Zapiski,* whose editor he was, a thorough description of natural conditions of the territory of the province. Regarding the salt lakes, he listed nine of them as most prominent for salt extraction, all of them being connected by a channel of 30 *versts*[4] long and 10 *versts* wide. According to his opinion, the quality of salt was completely similar to that of Crimea (Свинин 1818: 136, 185). Much later, geographic description of New Russia and Bessarabia, made by historian and statistician A. A. Skalkovsky, included the description of 14 saline lakes in the whole southern Bessarabia, namely: Cahul, Yalpug, Safyan (Saftyan), Katlabug, Kitay, Sasyk (Kunduk), Shagan (Tchagan), Alibey-Ulu, Sariar, Karachaus, Altigol, Khadzhydere, Burnas, Ezeryan (Скальковский 1850: 157-158).

Nevertheless, only lakes called Alibey (44 km of shore line) and Shagan (38 km shore line), covering an area of about 300 square *versts* separated from the sea by a natural shoal of 33 km long, were considered to be proper for salt extraction in industrial scale (Мунтян 1971: 234; Гроссул and Будак 1967: 48).

Although Lake Sasyk (Kunduk) was also producing a good layer of salt, estimated to 5-10 millions of *poods* of salt a year, the extraction of salt was not officially performed there. The territory of salt pans occupied over 72 thousand dessiatins, and other 9000 dessiatins[5] of land were allocated in course of time for the purpose of housing permanent and seasonal workers and for grazing large numbers of draft animals, used for hauling of salt (Гроссул and Будак 1967: 300).

The extraction process was quite simple. Workers entered the shallow waters of the lake and crushed its bottom, which consisted of deposits of salt sediments. The salt was then taken with forks and deposited on the shore in the form of hillocks. Drying in the sun it formed a solid mass. The season of salt extraction began on 1 August and lasted, if weather allowed, until November. According to a contemporary, A. Skalkovski, ordinary working people were coming in advance, with their families, carts and cattle, and were settling in encampments within the area of the crafts until the beginning of salt extraction season (Скальковский 1849b: 207).

Already in 1813, the head of Bessarabian Customs Control, L. S. Baikov, was reporting to his superiors that the salt extracted from salt lakes in Akkerman neighbourhood constituted one of the main branches of the domestic industry and that a large amount of salt was exported to neighbouring gubernyas (Tomuleţ 2015: 140).

The imperial resident in Bessarabia, A. N. Bahmetev, firstly named in 1816, showed a close concern for the

[4] *Verst* – Old Russian unit of measurement, equal to 1.0668 kilometres (0.6629 miles; 3,500 feet). A square verst is equal to 1,13806224 square kilometres. 1 *verst* is defined as being 500 *sazhens* long.

[5] A *dessiatin* or *desyatina* (Russian: Десятина) is an archaic land measurement used in tsarist Russia. A *dessiatin* is equal to 2400 square *sazhens*, and is approximately equivalent of 1,09 ha, 10,925 square metres or 2.702 English acres.

production of salt in Bessarabia. On 9 March 1818, he wrote to the First department of the local government to keep strict records on saline lakes of the Akkerman neighbourhood.[6] On 29 May 1818, he appointed an inspector for saline lakes, which were at that time in Bender County.[7] Provincial governance allowed the use of wood from state forests for use at the saline lakes.[8]

There were also undertaken a series of works for the arrangement of lakes. These works were contracted by the already mentioned entrepreneur from Akkerman – Stratos Kalfa, who agreed under a contract with the provincial administration to improve the situation of saline lakes, and managed to bring most of them to very good condition. Therefore, on 22 June 1818, A. N. Bahmetev asked the Provincial Government of Bessarabia, in addition to the payment of 12,000 lei stipulated by contract, to grant Stratos Kalfa an extra 4000 lei, and subsequently, on the accomplishment of the works, another 4000 lei.[9]

Still, despite the efforts of Stratos Kalfa, from a report of the inspector of state properties of Bessarabia, addressed to A.N. Bahmetev, on the situation of saline lakes of province, we learn that the protection dam between the lakes Altyn-Gyol and Karachaush required repairs in order to benefit from the harvest that promised to be high that year. For that purpose, on 10 July 1818, the imperial resident requested from the Bessarabian regional government to allocate another 1000 roubles.[10]

To facilitate export of salt into over the Dniester gubernias, A. N. Bahmetev addressed on 19 June 1818 to the military governor of Kherson, Count A. F. Langeron,[11] several important proposals. He wrote that saline lakes in Bessarabia were well-disposed and he was sure that summer would bring a rich harvest. He proposed to reduce the local tax, levied per *pood* of salt sent to the internal counties of Bessarabia, and to exempt from customs duties the salt sent over Dniester. Also, he insisted that industrialists and traders of salt to be allowed to pay the taxes in salt, asking the Kherson military governor to inform all the officials and inhabitants under the jurisdiction of the latter about any eventual positive decision on his proposals.[12]

As weather conditions changed, A. N. Bahmetev asked the provincial government on 25 July 1818, in order not to prejudice the invested resources in that year and not to bankrupt the industrialists, to allow that the fee of 2.5 assignation kopeks per every *pood* of extracted salt to be paid only on the sending of it for sale, instead of contractors being obliged to deliver 1/10 from the quantity of extracted salt for state needs.[13]

In the second half of 1818, the extraction of salt was institutionalised, by establishing in Bessarabia of the Administration of Saline Lakes. The Russian government had set up special administration bodies for saline lakes all over the Empire in accordance to the Salt Regulation of 5 August 1818, which didn't refer in any way to Bessarabia, so we are not sure on which provisions it functioned, as the province kept formally a legislative autonomy.[14] The establishment of such a body was probably an initiative of a local imperial resident, avowed enemy of historical peculiarities of the province, eager to spread Russian norms and institutions within it. As an argument, we notice that according to the report of 13 November 1818, addressed to the imperial resident by Supreme Council of Bessarabia, an edifice for the Bessarabian Administration of Saline Lakes was successfully constructed, namely from the financial accumulations of the province.[15] Even though the Bessarabian Administration of Saline Lakes was not an imperial entity, and its attributions were definitely not recognized beyond the borders of Bessarabia, we still have to admit that the institutionalisation of the salt industry in Bessarabia had a positive effect on its development. In one of the later reports of the governor of Bessarabia to the interim general governor of Odessa, dated 8 June 1882, is noted that proper development of the salt extraction from the salt lakes of the southern Bessarabia had begun in 1819.[16]

The officials of the Bessarabian Administration of Saline Lakes took their job quite seriously and were planning no less than binding serfs to lakes, as it was on the saline lakes from Saratov and Orenburg gubernyas, even given the fact that serfdom was not expanded in Bessarabia. A first attempt in this regard, of the Director of Administration of Saline Lakes, was rejected by the regional government on the decision of A. N. Bahmetev from 14 September 1818.[17] Subsequently, gaining support of the successor of A. N. Bahmetev, General I. N. Inzov, the officials of the Bessarabian Administration of Saline Lakes attempted again in 1822 to obtain such permission from the imperial government, but the response of count I. A. Kapodistrias, Minister of Internal Affairs, ascertained that the emperor had no intention

[6] NARM, F. 17 [Chancellery of imperial resident in Bessarabia], inv. 1, d. 114, l. 72.
[7] NARM, F. 17, inv. 1, d. 114, l. 141.
[8] NARM, F. 17, inv. 1, d. 119, l. 253.
[9] NARM, F. 17, inv. 1, d. 119, l. 956-956 verso.
[10] NARM, F. 17, inv. 1, d. 117, l. 19-19 verso.
[11] Renamed by Russian to Alexandr Fedorovich, a French nobleman whose real name was Louis Alexandre Andrault de Langeron.
[12] NARM, F. 17, inv. 1, d. 119, l. 924 verso – 925.
[13] NARM, F. 17, inv.1, d. 117, l. 77.
[14] Полное собрание законов Российской империи [Complete Law Collection of Russian Empire] (following marked as ПСЗРИ) (собрание I), том XXXV, 1818, СПб., 1830 №27448, с. 374-375.
[15] NARM, F. 17, inv. 1, d. 199, l. 263.
[16] National Archive of Republic of Moldova (following marked as NARM), Fund 241[Bessarabian Administration of Saline Lakes], inventory 1, dossier 43, leaf 3.
[17] NARM, F. 17, inv. 1, d. 117, l. 151.

to limit the freedom of inhabitants of the province (Мунтян 1971: 235).

In an attempt to recoup investments, the provincial government increased in 1819 the fee for extraction of salt in the province to 8 lei for each *kila* (or 35 assignation kopeks for *pood*), but this had a reverse effect. As a result, on 1 September 1820, the Provincial Council of Bessarabia decided to reduce the salt extraction fee from 8 to 3 lei for each *kila*.[18] This measure attracted to the saline lakes many entrepreneurs and merchants from different regions of Bessarabia, the gubernias of Kherson, Kiev and Podolia.[19] Consequently, the Administration of Saline Lakes reported in 1821 that two times more salt than in previous years were extracted and marketed.[20] In response, the Minister of Finance, Count D. A. Guriev, proposed to the Committee of Ministers to subject the salt imported from Bessarabia to Russian gubernyas with a custom duty of 40 assignation kopeks per *pood*, a proposal approved on 12 October 1820. On 4 January 1821, however, the Russian emperor asked the Minister of Commerce to clarify the protest of I. N. Inzov against such a decision. I. N. Inzov claimed that measures were taken to improve the situation of the salt industry in Bessarabia, and therefore the implementation of that decision had to be postponed until the accomplishment of the plan. Arguing his position, I. N. Inzov mentioned that in 1819, when the fee for the right of extraction of salt was 8 lei for a *kila*, the state income was 89,800 assignation roubles, a sum that could barely cover expenses incurred for the reparation of dams between lakes and sea. In 1820, when the fee was reduced to 3 lei per *kila* (13 assignation kopeks for the *pood*) income reached 169,380 assignation roubles. The Minister, however, did not agree with the arguments of I. N. Inzov, his response stating that, in 1820, the state suffered losses following the admission of duty-free salt from Bessarabia of 800,000 assignation roubles, as the sale of Crimean salt decreased by 1.2 million *poods* (Tomuleţ 2002: 213-214).

The Russian Government would continue to lose substantial revenue, as local salt was still sold at prices much lower than Crimean salt. Consequently, it decided, on 30 September 1821, to increase the custom duty for the salt transported over Dniester River to 60 assignation kopeks per *pood*.[21] A group of merchants from Odessa protested against this assessment, claiming they prepared high reserves of salt, which no longer sold because of the high price. But the Committee of Ministers categorically refused to accept their claims, admitting only the possibility for the merchants to pay the custom duties with delay, after the salt was sold.[22] Even though the tax on Crimean Salt was eventually drastically reduced, and its price was dropped from 95 to 15 assignation kopeks, by the decision of the Committee of Ministers of 25 February 1824, the exportation of Bessarabian salt into over the Dniester gubernyas was left on the same basis.[23]

Several saline lakes form Budjak were still given in concession to private industrialists, either local, or from neighbouring gubernyas. This practice lasted until 1823, producing a low annual income for the Russian government of up to 35 thousand assignation roubles a year. In consequence, local government decided to abandon completely the practice of concessions of salt lakes. The Administration of Salt Lakes made an appeal to entrepreneurs in the province and beyond to try salt extraction, setting a charge of four assignation kopeks per *pood* of extracted salt and five kopeks per *pood* of traded salt. This influenced a sudden increase in the volume of extracted salt, its reserves reaching in 1827 ten million *poods*, of which about 9.2 million were owned by private industrialists. Additionally, not all the extracted salt was accounted for by the Administration of Salt Lakes, as many peasants from nearby villages extracted salt without permission and sold it at the nearby local markets (Мунтян 1971: 236). During 1820-1825, the volume of exported salt to over Dniester gubernyas cumulated to 6,028,476 *poods*, which is an average of 1,004,746 *poods* a year (Tomuleţ 2015: 135).

The period of relative autonomy of Bessarabia within the Russian Empire ended in 1828. Several laws were adopted in 1830 that were meant to eliminate any economic advantages of the province, as it was to be united in customs and sanitary aspect with the rest of Empire. The industry of salt extraction was also targeted. Thus, in accordance with the Regulation of **26 May 1830,** salt extraction was completely taken under state control, and the price on salt was to be set by the state as in the rest of the Empire. The Bessarabian Administration of Saline Lakes was now officially and plenipotentiary established, and the production of salt was thus brought completely under its regulations.

The Regulation stated that the Administration was extracting salt by order of the Department of Mining and Salt Affairs and was to maintain a reserve for three years of salt, according to the previous year's consumption. The price of Bessarabian salt was to be published every year, in the general pricelist for salt in the Empire. The price included, beside the state

[18] NARM, F. 3 [Provincial Council of Bessarabia], inv. 4, d. 128, l. 44 verso.
[19] NARM, F. 5 [Provincial Government of Bessarabia], inv. 1, d. 132, l. 312 verso.
[20] NARM, F. 5, inv. 1, d. 132, f. 312 verso.
[21] ПСЗРИ (собрание I), том XXXVIII, 1822-1823, СПб., 1830, №28861, с. 4.
[22] ПСЗРИ (собрание I), том XXXVIII, 1822-1823, СПб., 1830, №29579, с. 1164
[23] ПСЗРИ (собрание I), том XXXIX, 1824, СПб., 1830, №29812, с. 164-166.

tax, all the costs of production, those required for maintenance of salt lakes and for salary of employees of the Salt Administration. Two points were assigned for the buyers to transport the salt from lakes: the first at the lake Shagan, through the duct connecting the lake with the lake called Small Sasyk, the other through the dam between the lakes Alibey and Kurdol. To protect against theft of salt from the lakes, the Bessarabian Administration of Saline Lakes was prescribed to keep horse rangers. The salt was to be extracted only from the lakes produced the best quality (namely Shagan and Alibey); the others lakes were to be protected for the prevention of illegal extraction. Salt workers were to be engaged only in artels, which included at least ten men, including one leader. The salt was to be deposited by workers into hillocks, around which they were to dig ditches and which they were to cover properly with reed, prepared in advance at the expense of the Administration of Saline Lakes. The hillocks were to have correct form with a prismatic top as a semblance of roof. The workers were to be paid partially in advance, receiving the rest of the agreed sum after the works were accomplished. In the case that the salt, due to bad weather, did not yield, the prepayment was not returned, but in the next year the contract would have been worked out, with no extra fee. All the hillocks were to be numbered and registered in the *Hillock book*, including the year of extraction, its length and width through top, the weight of salt in one cubic *sazhen.*[24] Private industrialists could sell their salt reserves at a desired price, but were due to pay the state tax of 60 assignation kopeks per *pood* of salt taken out from the lakes area. They were allowed to take their previously extracted salt deposited near the lakes without time limit.[25]

The official opening of the Bessarabian Administration of Saline Lakes occurred on 1 October 1830,[26] and its staff counted 56 employees, including the director, with a total salary of 12,000 silver roubles a year. Except ten employees, who were under the Treasury Chamber of Bessarabia and were performing accounting tasks, the others were directly subordinate to the director of the Administration. [27] On the other hand, the state tax on salt was introduced in Bessarabia two months later, from 1 December 1830,[28] the price of state salt being set to 66 assignation kopeks.[29]

The provisions of the Regulation of 26 May 1830 apparently created a favourable field for machinations and abuses. Several denunciations were made in 1835, which were closely investigated by a prosecutor dispatched by the Ministry of Finance. Fifteen officials were put under accusation, namely: three high ranking officials of the Ministry of Finance in Sankt Petersburg – *court counsellor*[30] Moiseev, *court counsellor* Pavlinov, *titular counsellor* De-Lafonten, counsellor of the Administration of Saline Lakes collegial assessor Ivanov, treasurers *titular counsellor* Kopeikin and noblemen Balas, police officer of Alibey lake, Reimer, and others. Also eight entrepreneurs were suspected of fraudulent actions: petty entrepreneur from Balti Zelzer, Akkerman townsmen Artem Mogordichev and Ovanes Popov, merchant of Balta Volf Golden, merchant of Kremenchug Fyodor Smirnov, Kishinev townsman Mendel Reidel, merchant of Akkerman Vasili Spiridonov, merchant of Dubbosar Izrail Vaks.[31] As a result of the investigations, which ended in 1838, fourteen persons were found guilty under different articles of accusation, including former administrators of the Saline Lakes Dubetski and Reimer, police officers Mikhailov, Zhakovski, Botsyanovski, deputy of police officer Radionov, counsellors of the Administration of Saline Lakes Romashko, Peters and Gorepkov, outpost controllers Borodavkin, Yashinski, Melgunov, Volohov and Zharkovski.[32]

Former director of the Administration of Saline Lakes, *state counsellor* Dubetsky (1835-1836), who was not among suspected the officials at first, was found guilty of selling at under the legal price of 500,000 *poods* of salt to former employee Romashko, in August and September 1835, for a total sum of 250,000 roubles, that is at 50 assignation kopeks for *pood*.[33] Also, Dubetsky was found guilty in 1835 of having extracted 4.2 million *poods* of salt, even though being ordered to prepare for state reserves only 3 million of *poods*. The difference was not registered in the account books,[34] so he managed to sell 200,000 *poods* of salt without levying of the state tax, at a price of only 15-20 assignation kopeks per *pood*.[35] Dubetsky was arguing in his defence that the named salt was of bad quality and also that the prosecutors were miscalculating the quantity of the salt, due to the fact that they considered the acute angles of the hillocks to be equal. He ascertained that nobody measured the base angles of the hillocks and gave an example with a hillock of a private owner, the Greek Papa Panaiot. According to the calculations,

[24] *Sazhen* is an obsolete Russian unit of length, defined as being 1/500 *versts* long , divided to 3 *arshins*. 1 *sazhen* = 7 British feet = 84 inches = 2,1336 metres.

[25] ПСЗРИ (собрание II), том V, 1830, отделение 1, СПб., 1831, №3678, с. 468-474.

[26] ПСЗРИ (собрание II), том V, 1830, отделение 2, СПб., 1831, №4097, с. 376.

[27] ПСЗРИ (собрание II), том V, 1830, отделение 1, СПб., 1831, №3678, Штаты и Табели, с. 227.

[28] ПСЗРИ (собрание II), том V, 1830, отделение 2, СПб., 1831, №4049, с. 237.

[29] ПСЗРИ (собрание II), том V, 1830, отделение 2, СПб., 1831, №4196, с. 511.

[30] According to Table of ranks, introduced by Peter the Great in 1722. Ranks mentioned in text: *state counsellor* - civil rank of grade V; *court counsellor* – civil rank of grade VII; *titular counsellor* – civil rank of grade IX.

[31] NARM, F. 241, inv.1, d. 11, l. 166-167.

[32] NARM, F. 241, inv.1, d. 11, l. 185-185 verso.

[33] NARM, F. 241, inv.1, d. 17, l. 1.

[34] NARM, F. 241, inv.1, d. 17, l. 6.

[35] NARM, F. 241, inv.1, d. 17, l. 11.

the hillock of the latter was found to have 5452 cubic *arshins*[36] of salt, which assuming each cubic *arshin* was equal to 26.5 *poods*, represented a quantity of 144,491 *poods*, while according to mathematical calculation based on the registered data it should have a volume of 5427.5 cubic *arshins*, or 143,715 *poods*.[37] As seen from the investigators papers, the length of hillocks varied from 30 to over 145 *arshins* (~21-103m), while the length over the top was about 20 *arshins*, almost constantly.[38] This had a practical use, as it allowed a close estimation of salt quantity without weighting it, but it also allowed for an error margin.

Another point of accusation was the requirement for the Administration to prepare reed necessary to cover the hillocks. As it was found, in 1836 the volume of reed used for the covering of 51 hillocks, situated near Shagan and Alibey quarters of extraction, was estimated to 5663 square *sazhens*, or 944 cubic *sazhens*, with a medium roof thickness of eight *wershoks*.[39] In that year about 1300 cubic *sazhens* of reed was bought by contract from petty entrepreneurs Haim Glatshtein and Leiba Doibani, with a medium price of 15.3 roubles, including transportation. The total sum paid by the Administration of Saline Lakes was 19.9 thousand roubles, but it allocated for this purpose in that year 27 thousand roubles, so that the fate of the rest was unclear.[40]

Also a point of indictment was that the officials of the Administration of Saline Lakes allowed peddling of salt in quantities smaller than 50 *poods* per invoice, which was prohibited. Thirty such cases were found out in the accounting books for the period 1834-1837 relating to state salt and sixteen relating to private salt.[41] Beyond this, prosecutors found out that remaining private hillocks were also a source of abuse. A series of investigations were made regarding the quantities exported each year and if the remains corresponded to what it should or if the hillocks were still filled fraudulently with extracted salt. According to the measurements of *obermeister* Deihman, the situation on 1 January 1838 showed the scarcity of salt to be 211,664 *poods*, with a huge deficiency in the hillocks of salt produced earlier than 1833. For the years of production 1835-1836 an excess of salt was found, amounting to 120,000 *poods* in state hillocks and 34,000 in private hillocks of 1834 production. In addition, from the state hillocks in 1837 22,000 *poods* salt were fraudulently sold from the 1835 production year, and 55,000 *poods* from private hillocks of the 1834 production year.[42]

In order to eliminate such abuses, on **6 April 1837**, upon approval by Emperor Nicholas I of the New *Regulation on organization of salt industry in Bessarabia,* private industrialists were given a period of two years to evacuate their salt deposited near the saline lakes. Finally, on 18 October 1838, the Committee of Ministers decided that salt of private owners, which had not been discharged under the provisions of Ukase of 6 April 1837, must be sold solely to the state at the production cost of 5 assignation kopeks per *pood*, provided that industrialists were able to present the documents on its extraction.[43] It must be mentioned that the named Regulation of 6 April 1837, contained also a number of other provisions on the organization of the salt industry in Bessarabia.[44] First of all, the village Tuzla, the residence of the Bessarabian Administration of Saline Lakes, was transformed into a town. The police officer of Tuzla received a series of instructions not to impede the activity of salt carters and entrepreneurs that passed the town on their way to salt ponds. Any law violation on the territory of Saline Lakes entered in his jurisdiction, but he was allowed to investigate it only on the request of the Administration of Saline Lakes, and with the participation of its delegate. Penal cases or those related to illegal sale of salt or alcoholic drinks, were allowed to be investigated on will, after obligatorily informing the Administration of Saline Lakes, and again with the participation of its delegate. The instructions also included the obligation to insure food and water supplies at reasonable prices in Tuzla, so that salt carters and workers would have no shortages. Apportion of parcels for houses in Tuzla was also allowed to him, but, once more, with prior permission of the Administration of Saline Lakes.[45]

Several other proposals are mentioned in the Regulation preamble. Lieutenant General E. V. Karneev, head of Department of Mining and Saline Affairs, suggested forbidding direct marketing of salt from lakes in order to prevent known abuses. In his opinion, the salt exported over Dniester was better to be sold in Ovidiopol, while that for the internal use of the province should be sold in Akkerman. The minister of finance proposed also Mayaki and Palanca as options. However, Count M. S. Vorontsov, governor-general of New Russia and Bessarabia, considered that the idea would not have the desired effect and instead would generate excessive costs that would negatively affect the final price of salt. The Minister of Finance had to accept his point of view. Thus, the main approved amendment proposed by Lieutenant General E. V. Karneev, consisted of increasing the number of

[36] *Arshin* – Old Russian unit of measurement for length: 1 *arshin* = 1/3 *sazhens* = 16 *wershoks* = 28 inches = 0,7112 metres.
[37] NARM, F. 241, inv.1, d. 16, l. 691.
[38] NARM, F. 241, inv.1, d. 9, l. 40-42 verso.
[39] NARM, F. 241, inv.1, d. 9, l. 40-42 verso.
[40] NARM, F. 241, inv.1, d. 9, l. 18 verso-19.
[41] NARM, F. 241, inv.1, d. 14, l. 70-72.
[42] NARM, F. 241, inv.1, d. 15, l. 12.
[43] ПСЗРИ (собрание II), том XIV, 1839, отделение 2. СПб., 1840, Прибавления, №11651а, с. 20.
[44] ПСЗРИ (собрание II), том XII, 1837, отделение 1, СПб., 1838, №10099, с. 209-215.
[45] ПСЗРИ (собрание II), том XIII, 1838, отделение 2, СПб., 1839, №11877, с. 432-433.

guardians for the salt lakes and of reducing the number of checkpoints for the transportation of salt from lakes from two to one, in order to reduce the abuses. On the other hand, the governor-general of New Russia and Bessarabia was authorised to seek ways of facilitating the transportation of salt over the Dniester and means for the construction of salt deposits outside the borders of the free port Odessa in order to allow carters carrying grain to this seaport to transport salt on their way home.[46]

In short time, the statements regarding the necessity to improve the conditions for the transportation of salt over the Dniester started to be created. On 29 August 1838, the Minister of Finance proposed to the Committee of Ministers to approve the establishment from state resources of communication by steamships between Akkerman and Ovidiopol. According to the authors of this project, the naval connection between Akkerman and Ovidiopol aimed at stimulating the exports of grain and salt from Bessarabia in order to counteract the growing competition from the Danubian ports of Galatz and Braila. Merchants, who purchased salt from Bessarabia, could build warehouses outside the zone of Odessa Porto Franco and sell salt according to regulations. Such deposits could be also built on the state account, if found necessary. On 4 October 1838, the Regulation establishing the steamship connection between Akkerman and Ovidiopol was approved by the emperor. The same decree allowed merchants of salt to establish salt storage magazines on the right bank of the Dniester lagoon and even near Odessa, outside the area of free port, and to market the salt according to the regulations.[47]

Although not approved by the Regulation of 1837, the suggestions of Lieutenant General E. V. Karneev were also started to be implemented. Emperor Nicholas I issued on 30 March 1843 a ukase for the establishment in Akkerman of state reserves of salt. According to its provisions, 72,000 roubles were allocated for the construction of salt storage deposits in Akkerman and for transportation of 50,000 *poods* of salt to them. Salt was supposed to be sold there at 30 silver kopeks per *pood*, which included the production cost of 2 kopeks, transport costs and other expenses amounting to 3 kopeks, and the state tax of 25 kopeks.[48] It allowed the establishment, if found necessary, of state reserves also in Ovidiopol.[49]

The increase in salt production and export apparently created problems for the employees of the Bessarabian Administration of Salt Lakes, the number of whom proved to be insufficient. According to a petition signed by 23 industrialists on 27 June 1844, addressed to the official of the Ministry of Finance for special assignments, *court counsellor* P. Kremenetski, due to the insufficient number of gate controllers, the carters were waiting in line 8-10 days for the loading.[50] As the official was writing in his report of 28 June 1844 to the Ministry of Finance, F. P. Vrontchenko, the line was of 12-15 *versts* from the Alibey Gate. According to his observations, once allowed in, the carts returned usually in ten or even more days, even though the distance to the lakes was only 15 *versts*. On 5 June near the lake gathered about 5000 carts, while the number of cattle exceeded 10,000. The presence of so many cattle in the lakes area for so long, depleted rapidly the pastures and drained the wells. Due to this situation, the cases of murrain increased significantly. In his opinion, the situation was not due to insufficient personnel but to poor performance of authorities of the saline lakes.[51] As an answer, on 20 and 27 July 1844, the minister demanded from the Bessarabian Administration of Saline Lakes to eliminate all the delays, urging the loading of salt from several hillocks at once, prompt purchase of reed required for the cover of the new yield, and the immediate accomplishment of all legal requests of the official for special assignments, P. Kremenetski.[52]

On the other side, it is interesting that P. Kremenetski refused the proposal of the Administartion of Saline Lakes of 2 April 1844, to allow based on best offer, a private entrepreneur to physically measure the salt in all 207 hillocks, as it was demanded by regulations. The bidding ended with the proposal of the Kilya entrepreneur Leizer Strahilevich of 6.5 silver roubles for each hillock. Instead, P. Kremenetsky requested that the necessary works be done by guardians of the salt ponds, thus distracting them from their job. The administration responded that only six guardians were available, but the works could not be accomplished in due time. As the risk of leaving hillocks uncovered increased, it requested permission to hire more workers. Eventually, in order to accomplish the measurements, Leizer Strahilevich was allowed to engage 12 workers with a payment of 50 silver kopeks a day for each.[53] The demand for a larger staff was clear, and the Russian government decided to increase it. By the ukase of 16 October 1846, four more members completed the existing staff: one controller, one deputy for chief clerk, one archivist and one more official for special assignments.[54]

[46] ПСЗРИ (собрание II), том XII, 1837, отделение 1. СПб., 1838 №10099, с.209-215.
[47] ПСЗРИ (собрание II), том XIII, 1838, отделение 2. СПб., 1839, №11588, с. 185.
[48] Eventually the price would be fixed to 29 silver kopeks. ПСЗРИ (собрание II), том XXIII, 1848, отделение 2, СПб., 1849, Штаты и Табели, №22816, с. 226.
[49] ПСЗРИ (собрание II), том XVIII, 1843, отделение 1, СПб., 1844, №16669, с.181-182.
[50] NARM, F. 241, inv.1, d. 25, l. 1-2.
[51] NARM, F. 241, inv.1, d. 25, l. 3-6 verso.
[52] NARM, F. 241, inv.1, d. 25, l. 7-12.
[53] NARM, F. 241, inv.1, d. 26, l. 1-15.
[54] ПСЗРИ (собрание II), том XXI, 1846, отделение 3, СПб., 1847,

The salt industry reached in 1840s its peak development. The average annual extraction of salt varied from of 3 to 6 million *poods*, and in some years production hit even 8 million *poods*. Within a quarter century, the salt production had increased more than 30 times. If in 1819 the production was estimated to 234,510 *poods*, then in 1820 it would have been 1,393,609 *poods*, in 1821 to 3,721,001 *poods*, in 1826 to 6,616,347 *poods*, in 1835 to 4,003,853 *poods*, in 1840 to 5,888,053 *poods*, and in 1844 to 8,308,163 *poods*.[55]

As the director of the Bessarabian Administration of Saline Lakes was reporting on 8 December 1842 to the Department of Mining and Salt Affairs of the Ministry of Finances, the quality of salt differed from place to place and from year to year. In the Alibey lake, from Khadzhyder dam to the *Kalfin House*, the quality of salt was usually of medium quality; from *Kalfin House* barrier spit to Lake Shagan, and from there to the Southern cordon, the salt was usually of good quality; from the Southern cordon to Shagan precipice, opposite to Shagan village, the salt was usually of medium quality; from there to the foreland called Kamchatka, due to swampy ground, the salt never produced; at the foreland Kamchatka of the Alibey lake the salt was of good quality, even though it had some admixture of sea shells; from Kamchatka foreland at the precipice in the north-western part of Alibey lake and to Khadzhyder embankment the salt was usually of medium quality.[56]

In the 1840s, during the extraction season, about 10-12 thousands workers were involved in the production of salt, while the number of wholesale buyers reached even 700 a year, from whom only 250 were from Bessarabia (Скальковский 1849b: 208). In 1845, for example, 11,970 workers were employed in the production of salt, while the number of wholesale buyers was 658, with only 254 from Bessarabia (Жуков 1964: 138). The proximity of ponds and the development of salt industry contributed to the emergence in nearby localities of 'salt crafters', who were indentured to extract tens of thousands of *poods* each year. Among salt workers who operated at the lakes were not only townsmen but also large groups of villagers, who organized themselves as required in artels. Each artel leader disposed of tens and hundreds of workers during the season (Анцупов 1978: 168, 171).

It is necessary to mention that, in 1844, a group of inhabitants of Tuzla requested form the Ministry of Finance more contracts for the extraction of salt, claiming it was their only means for living. Actually, they requested the right to extract up to two million of *poods* of salt. The Minister of Finance allowed the additional production of one million of *poods* of salt to the quantity assigned for that year, of four million of *poods*, in order to offer more contracts to requesters from Tuzla. But as it can be seen from the source, most of the artel leaders claiming to be natives of Tuzla were entrepreneurs from Akkerman, who settled down in this town to seek profit.[57] An idea of the scale of contracts can be created based on data presented in the Figure 2.

As we see in the Figure 2, from the total quantity of salt contracted to be extracted of 5 million *poods*, the share of townsmen represented is 2,655,000 (53.1%), and the share of villagers is 2,345,000 (46.9%). While almost all townsmen were representatives of *meshchane*, or the petty entrepreneur class (the only exception is a representative of Free Sailors guild), villagers belonged to different social categories, such as peasants, colonists and even Cossacks of Danube Host. The latter also engaged in the guarding of the lakes. Regrettably, we could not find similar data for other years, but for many villagers, the salt craft became a constant family entrepreneurship. Such cases are found all over the 1820s-1840s in the villages of Shagan, Pavlovka and others. Some peasants were deeply involved in salt craft and gradually began to leave agricultural activities. In some villages peasants left agriculture and only dealt with salt production. As the mobility of this population grew, a process of *unpeasanting* of ploughers started. But this process should not be considered a definitive break-up of these peasants with the village. Most families kept their lands and engaged at the same time in salt production, investing more and more time for the latter (Анцупов 1978: 168, 171).

The earnings from salt extraction were very important to such people. In 1841, when the lakes were flooded due to heavy rains, contractors claimed promptly that the quantities of the salt for the year 1841 to be transferred for the year 1842, even if no money were given to them in advance.[58] Of course the later required the availability of necessary work forces to overtake the whole job, as each year they signed a new contract. This was the case for peasants from Sofievka, Annovka and Marienovka villages from the estates of Count Benkendorf, who by contract of 28 August 1841 were obliged to extract 90,000 *poods* of salt. As the salt didn't produce that year, by contract of 20 July 1842, they claimed in addition to the 200,000 *poods* negotiated for extraction that year, to be allowed to extract also 90,000 *poods* negotiated in 1841.[59] Several other contractors who undertook to perform the extraction of salt in that year, in the following year claimed instead, from the Administration of Saline Lakes, to be ceded over the agreed payment, one silver kopek from each *pood* of extracted salt, in order to recoup from their disastrous state due to lack of yield in the preceding year.[60]

№20524, c. 149.

[55] NARM, F. 241, inv. 1, d. 43, l. 3-3 verso.

[56] NARM, F. 241, inv.1, d. 20, f. 44-45.

[57] NARM, F. 241, inv.1, d. 27, f. 1-8.

[58] NARM, F. 241, inv. 1, d. 20, l. 245.

[59] NARM, F. 241, inv.1, d. 20, l. 245.

[60] NARM, F. 241, inv.1, d. 20, l. 86-88.

No.	Townsmen				Villagers			
	Artel leader	Locality	I	II	Artel leader	Locality	I	II
1	Fyodor Nikitin	Akkerman	1	30000	Afanasi Murzin	Akmangit	1	25000
2	Iosif Kuzmin	Akkerman	1	30000	Demyan Tashmachevski	Akmangit	1	25000
3	Aleksey Karpov	Akkerman	1	30000	Konon Mologa	Akmangit	1	25000
4	Tihon Belyaev	Akkerman	1	30000	Anisim Benderski	Galileshti	1	30000
5	Ilya Chichikov	Akkerman	1	30000	Yakov Kentzle	Gnadenthal	2	60000
6	Mikhail Bobrov	Akkerman	1	30000	Fridrich Gotman	Gnadenthal	2	60000
7	Leonti Smirnov	Akkerman	1	30000	Fridrich Gaibukh	Gnadenthal	2	60000
8	Klementi Dobrolyubov	Akkerman	2	60000	Artamon Mladentsov	Jebrieni	2	60000
9	Fyodor Kotramadi	Akkerman	3	90000	Mihailo Izotchinkov	Jebrieni	2	60000
10	Vasili Lehtevanov	Akkerman	1	30000	Ignat Svidorenko	Kebabcha	2	60000
11	Petr Ivanov	Akkerman	1	30000	Potap Pohilco	Kebabcha	2	60000
12	Stefan Roshyanov	Akkerman	1	30000	Ivan Pauk	Kebabcha	2	60000
13	Pavel Hmelevski	Akkerman	1	30000	Kalenik Taranenko	Kebabcha	2	60000
14	Konstantin Kiryakov	Akkerman	1	30000	Porefirii Gruzyi	Kebabcha	1	30000
15	Miron Derevenko	Akkerman	1	30000	Vasili Pilaev	Konstantinovka	1	25000
16	M. Dudnitski, K. Artyunov	Akkerman	1	30000	Ivan Sachinski	Konstantinovka	1	25000
17	Kiryak Chepche	Akkerman	1	30000	Diora Popov	Kulevcha	2	60000
18	Georghi Panayotov	Akkerman	1	30000	Pavel Dimov	Kulevcha	2	60000
19	Agop Chamurov	Akkerman	3	80000	Stanka Kuljiev	Kulevcha	2	60000
20	Eremey Eremeev	Akkerman	1	30000	Stamat Atanasiev	Kulevcha	2	60000
21	Sarkiz Tatarov	Akkerman	5	135000	Hariton Zaruba	Mihailovka	1	25000
22	Kirkor Agopov	Akkerman	2	60000	Ivan Afanasiev	Pavlovka	1	30000
23	Toros Vartanov	Akkerman	1	30000	Dmitri Goryapnov	Pavlovka	1	30000
24	Olan Kaymakchi Oglu	Akkerman	2	60000	Petr Afanasiev	Pavlovka	2	60000
25	Badem Kyorkov	Akkerman	1	30000	Ivan Kolosov	Pavlovka	2	60000
26	Karabet Vikelgorch	Akkerman	1	30000	Ignat Kolosov	Pavlovka	2	60000
27	Megerdich Avanesov	Akkerman	1	30000	Leon Kolosov	Pavlovka	1	30000
28	Babay Tatekov	Akkerman	1	30000	Emelian Beloborodko	Plahteevka	2	60000
29	Sarkiz Artyunov	Akkerman	1	30000	Semen Demurin	Plahteevka	2	60000
30	Madros Pastajiev	Akkerman	1	30000	Matvei Vikler	Sarata	2	60000
31	Gachadur Zadikov	Akkerman	1	30000	Vasili Novikov	Sergeevka	1	25000
32	Stepan Lgopov	Akkerman	1	30000	Dmitri Kotkov	Sergeevka	1	25000
33	Yani Kiryakov	Akkerman	1	30000	Grigori Lunkov	Sergeevka	1	30000
34	Harlampi Petrov	Akkerman	1	30000	Ivan Zhbankov	Sergeevka	1	30000
35	Iakov Bondarenko	Akkerman	1	30000	A. Filipov, A. Baranov	Sergeevka	2	60000
36	Ivan Ivanov	Akkerman	1	25000	A.Kozeltsov, I.Protasov	Sergeevka	2	60000
37	Martin Kuprikov	Akkerman	2	50000	Kuzma Shchelkunov	Sergeevka	1	30000
38	Vasili Brodeskul	Akkerman	2	50000	Aleksey Erohin	Sergeevka	1	30000
39	Hayrabet Megerdishev	Akkerman	1	25000	Vasili Polyakov	Shaba	1	25000
40	Sergey Rysin	Akkerman	1	25000	Mihailo Chabanenko	Shagany	2	60000
41	Hristofor Panayotov	Akkerman	2	50000	Emelian Pronoza	Shagany	1	30000

Figure 2. List of artels engaged in salt extraction based on the residence of their leader (1844).

No.	Townsmen				Villagers			
	Artel leader	Locality	I	II	Artel leader	Locality	I	II
42	Ovagim Mardaresov	Akkerman	2	50000	Dmitri Nishkanin	Volontirovka	1	25000
43	Ivan Dikedonis	Akkerman	2	50000	Yakov Obuhovski	Volontirovka	1	25000
44	Sergey Luska	Akkerman	2	50000	Filip Bulanyi	Volontirovka	1	25000
45	Hachadur Ohanov	Akkerman	1	25000	Fyodor Chapki	Volontirovka	1	25000
46	Apel Artyunov	Akkerman	2	50000	Vasili Baranski	Volontirovka	1	25000
47	Kirkor Avanesov	Akkerman	2	50000	Hristofor Somlev	Volontirovka	1	25000
48	Karabet Megerdishev	Akkerman	2	50000	Trofim Bragarenko	Volontirovka	1	25000
49	Karabet Kurdioglo	Akkerman	4	100000	Nastas Dragomir	Volontirovka	1	25000
50	Kirkor Zadikov	Akkerman	1	25000	Semen Pavlovksi	Volontirovka	1	25000
51	Pavlo Shevchenko	Akkerman	1	25000	Filip Zavalenko	Volontirovka	1	25000
52	Mihailo Zvezdovski	Akkerman	1	25000	Moysei Kochorva	Volontirovka	1	25000
53	Firs Radionov	Akkerman	1	25000	Sidor Efremov	Volontirovka	1	25000
54	Grigori Lebedev	Akkerman	1	25000	Ivan Prokopovich	Volontirovka	1	25000
55	St. Chernomorchenko	Akkerman	1	25000	Afanasi Alekseev	Volontirovka	1	25000
56	Nikolai Karpenko	Akkerman	1	25000	Emelian Korobchenko	Zolokari	1	30000
57	Dmitri Sinyukov	Akkerman	2	50000	Nikita Mihailenko	Zolokari	1	30000
58	Vakula Kazachenko	Akkerman	1	25000	Anton Kalinenko	Zolokari	1	30000
59	Arhip Zafoenko	Akkerman	1	25000	Trofim Potanenko	Zolokari	1	30000
60	Emelian Kovtunenko	Kishinev	1	25000	-	-	-	-
61	Choka Filipov	Tuzla	2	50000	-	-	-	-
62	Grigori Ivanov	Tuzla	3	75000	-	-	-	-
63	Pavel Chegornyi	Tuzla	1	25000	-	-	-	-
64	Zahar Kazachanko	Tuzla	1	25000	-	-	-	-
65	Petr Trachuk	Tuzla	1	25000	-	-	-	-
66	Trofim Voronenko	Tuzla	1	25000	-	-	-	-
67	Ipati Ignatov	Tuzla	1	25000	-	-	-	-
68	Evsey Yarovenko	Tuzla	1	25000	-	-	-	-
69	Ivan Zaporozhchuk	Tuzla	1	25000	-	-	-	-
70	Panaiot Papascutari	Tuzla	2	50000	-	-	-	-
Total			98	2655000			82	2345000

I – Number of artels led, II – the quantity of salt to be extracted (in *poods*). Source: NARM, F. 241, inv. 1, d. 27, l. 9-14.

Figure 2 continued. List of artels engaged in salt extraction based on the residence of their leader (1844).

The development of salt extraction determined also the development of 'carting craft'. Working carts were coming especially from the nearby state-owned townships, counties and colonist's villages and hamlets. Salt was transported to Ukrainian, Baltic and Polish gubernyas. Town Tuzla, the centre of the salt pans, was crossed by a number of roads: to Kilia, Akkerman, Bender, Tiraspol, Chisinau, by the passages of the lower Dniester River to Odessa, Nikolaev, Kherson, Voznesensk and others. Tens of thousands of carts loaded with salt moved in different directions on the country roads. The very character of transportation of this heavy cargo, due to continuous demand for salt, stimulated the appearance of carters 'trains', transportation artels, hired by large contractors.

The latter had a significant number of their own carts but could not manage without hired herders (Анцупов 1978: 171). In 1845, 28 thousand carters with 57 thousand of carts were involved in salt transportation (Жуков 1964: 138), while in 1846, there were 15 thousand carters with 60 thousand carts and 120 thousand heads of cattle (Скальковский 1849b: 210). If a normal cart with one horse could transport on average 25 *poods*,

then one with two horses could transport 45 *poods*, with three horses, 55 *poods*; while with a pair of oxen 65 *poods* could be transported, and with two pairs, 120 *poods*. There were also carts with more than two pairs of oxen, which were used only in Bessarabia, this transportation being called *cărăuşie*.[61]

In the records of the Bessarabian Administration of Saline Lakes of the National Archive of Republic of Moldova, we found several contracts between entrepreneurs and carters on the transportation of salt to different locations. The provisions are very similar from one contract to another. We will exemplify this based on one such contract in order to understand the rights and obligations of each part. Dated the 16 December 1845, the contract is signed in Akkerman between a merchant of the third guild from the city Kremenets, Volyn Gubernya, Pincas Volf Bronstein and villagers of Iaroslavka, Akkerman County of Bessarabia, Makar Hodos, Ivan Skalozub, Marko, Avram and Pavel Gubich, Iakob Korid, Denis Tolstoi. It stipulates that no later than 23 April 1846, the carters promise to present themselves and 30 carts, each with a pair of oxen, to the Bessarabian Salt Lakes, where they would load each cart with 61 *poods* of salt (two extra *poods* were added for spills), and to transport it safely to the city Kremets, as soon as possible. Also, the contract stated that for the lack of up to five *poods* of salt from each cart, the carters should pay the cost of lost salt at the lake's price; if more than five *poods*, they should pay the cost of lost salt at the delivery price. On delivery, the carters should not be detained for more than two days, except for the holidays, personnel days and bad weather days. For any delay, the carters should be paid 30 silver kopeks a day for each cart. The price of transportation was fixed to 15.5 silver roubles for each cart, from which 13.5 roubles were paid on the signature, and other two roubles on the load with salt. The carters swore to accomplish the job each for all, and all for each. If the carters would not be able to provide the agreed number of carts, not only should they repay the money, but also should pay to Bronstein five silver roubles for each missing cart. In case of shirking, the carters were liable with all their movable and immovable property.[62] In Figure 3, we present data provided by A. A. Skalkovsky on the revenues of the state from the wholesale salt from the Bessarabian lakes, which as he writes, he obtained in person from the Bessarabian Administration of Saline Lakes. As we were not able to find such series in archival sources, we attempt to calculate back the estimated quantity of salt sold each year in the period between 1831 and 1850 based on the price of salt, which, as mentioned above, was fixed every year.

The usage of this method allows us to recreate the dynamics, so we notice from the last row of the table in Figure 3 that, in 1841-1850, sales increased by 9,655,653 *poods*, or 69%, compared to the period 1831-1840, while the state revenues increased by 11,828,839 assignation roubles,[63] or 115,7%. Of course, we shall assume the quantities of salt of private industrialists, produced until 1830, which they could sell freely till 1838, and from which the state was obtaining less revenue. But even after that, a margin of error must be considered. Thus, if we compare available official data for 1846, which indicate the quantity of sold salt to be 2,674,685 *poods* (Скальковский 1849b: 210), we notice a 1.9% excess compared to what we obtained.

One question that arises is how a production of 5 to 8 million *poods* of salt a year relates to the export that never exceeded three millions of *poods*. The answer is that large supplies were required, because, in some years, salt was produced in low quantities or not at all due to flooding of lakes with sweet water, such as in 1825, 1830, 1831, 1837, 1838 and 1841. The law stipulated a reserve of three years should have been assured, but it must be mentioned that the medium stocks of salt in the second half of the 1840s was about 15 millions of *poods* (Гроссул and Будак 1967: 300), which is enough for at least five years of normal consumption. Large quantities of supply were important, as the salt was vital not only for humans, but also for cattle. In some critical situations, the government even sold it without state tax. For example, according to the ukase of 11 January 1849, in order to insure the supply with salt for cattle due to bad harvest in 1848, it allowed the sale in Bessarabia of one million *poods* of salt from state reserves at the price of eight silver kopeks, but only to those in demand with the presentation of a written certificate from local authorities, which would confirm that applicants require salt for feeding their cattle. The ukase also referred to other affected gubernyas.[64]

A bad harvest also occurred in 1847. Based on a report of 9 January 1848 presented to the military governor of Bessarabia by the chief of the Bessarabian Administration of Salt Lakes, at the beginning of 1847 state reserves of salt in the province amounted to 14,132,851 *poods*. During 1847 only 1,193,898 *poods* of salt were extracted, thus the total available quantity amounted to 15,326,749 *poods*. During 1847, from the existing reserves of salt were purchased 2,473,052 *poods,* at the price of 27 silver kopeks, while storage losses amounted to 431,118 *poods*, thus the reserve for 1848 was estimated to 12,422,579 *poods*.[65] Also, as can

[61] NARM, F. 241, inv.1, d. 14, l. 71 verso.
[62] NARM, F. 241, inv.1, d. 42, l. 38-39.
[63] The exchange rate of silver rouble was fixed in 1839 from that time forward to 3.5 assignation roubles. ПСЗРИ (собрание II), том XIV, 1839, отделение 1, №12497, с. 601.
[64] ПСЗРИ (собрание II), том XXIV, отделение 1, 1849, СПб., 1850, №22912, с. 31.
[65] NARM F. 2, inv. 1, d. 5044, l. 11-13.

Year	Revenue	Price	*Poods* (est.)	Year	Revenue	Price	*Poods* (est.)
1831	30307	0,66	45920	1841	476576	0,23	2072070
1832	23246	0,66	35221	1842	505948	0,27	1873881
1833	466527	0,66	706859	1843	569176	0,27	2108059
1834	846543	0,66	1282641	1844	700315	0,27	2593759
1835	1254105	0,66	1900159	1845	803236	0,27	2974948
1836	1970238	0,7	2814626	1846	722029	0,27	2674181
1837	1931431	0,75	2575241	1847	667724	0,27	2473052
1838	2285607	0,8	2857009	1848	663701	0,27	2458152
1839	820632	0,8	1025790	1849	544673	0,27	2017307
1840	595294	0,8	744118	1850	647413	0,27	2397826
Total	10223930		13987583	Total	6300791		23643236

For 1831-1840 in assignation roubles, for 1841-1850 in silver roubles. Sources: Скальковский 1853: 497; ПСЗРИ (собрание II), том V, 1830, отделение 2, СПб., 1831, №4196, с. 511; том VI, 1831, отделение 2, СПб., 1832, №4996, с. 278; том VII, 1832, СПб., 1833, №5779, с. 867; том VIII, 1833, отделение 1, СПб., 1834, №6605, с. 716; том IX, 1834, отделение 2, СПб., 1835, №7594, с. 212; том X, 1835, отделение 2, СПб., 1836, №8600, Штаты и Табели, с. 357; том XI, 1836, отделение 2, СПб., 1837, №9814, Штаты и Табели, с. 402; том XII, 1837, отделение 2, СПб., 1838, №10808. Штаты и Табели, с. 262; том XIII, 1838, отделение 2, СПб., 1839, №11892, Штаты и Табели, с. 278; том XIV, 1839, отделение 2, СПб., 1840, №12957, Штаты и Табели, с. 256; том XV, 1840, отделение 2, СПб., 1841, №13998, Штаты и Табели, с. 673; том XVII, 1842, отделение 2, СПб., 1843, №15244, **Штаты и Табели,** с. 15; том XVIII, 1843, отделение 2, СПб., 1844, №16426, Штаты и Табели, с. 37; том XIX, 1844, отделение 2, СПб., 1845, №17506, Штаты и Табели, с. 3; том XIX, 1844, отделение 2, СПб., 1845, №18556, Штаты и Табели, с. 346; том XXI, 1846, отделение 3, СПб., 1847, №19625, Штаты и Табели, с. 23; том XXII, 1847, отделение 2, СПб., 1848, №20829, Штаты и Табели, с. 21; том XXII, 1847, отделение 2, СПб., 1848, №21784, Штаты и Табели, с. 277; том XXIII, 1848, отделение 2, СПб., 1849, №22816, Штаты и Табели, с. 226; том XXIV, 1849, отделение 2, СПб., 1850, №23744, Штаты и Табели, с. 227.

Figure 3. State revenues from the extraction of salt in the lakes of Bessarabia and estimated quantity of salt sold based on state approved selling price (1831-1850).

be seen from this example, due to natural reasons, the depositing for many years inevitably meant losses of important quantities of salt. The hillocks were to be taken good care of. During winters, for example, the hillocks needed to be clean from snow after blizzards in order not to be compromised during melting.[66]

In 1850, the saline lakes of Bessarabia from Akkerman county were flooded and devastated completely. On the night of February 1st to 2nd, due to a heavy storm on the Black Sea, the shoal that separated the lakes from the sea was broken by waves and the lakes entered into direct contact with the sea, a situation which lasted until October. About 4.85 million *poods* of salt in hillocks were lost, and the yields for at least three years were completely compromised (Скальковский 1853: 498). The storage establishment for salt in Akkerman just wasn't big enough to keep such enormous quantities of salt, only being able to provide space for 100,000 *poods* of salt. Thus, the extracted salt was still mostly deposited in open air, near the lakes, which proved to be a critical error. In short time, the Committee of Ministers decided to close the Salt Store in Akkerman as being useless and to dismiss its staff.[67] As a result of this critical situation, on 7 April 1851, the Department of Mining and Salt Affairs, at the order of the Minister of Finance, Count F. P. Vronchenko, addressed to the Bessarabian Administration of Saline Lakes, an inquiry on the situation of salt stocks required for the consumption of the population from the province. According to the report, presented in response, the stocks amounted to only 660,000 *poods*, while the annual necessity was estimated to be 2.5 million *poods*. In these circumstances, Russian officials suggested to cover the deficit from Crimean salt reserves, which consisted in February 1851 of over 18 million *poods*, while annual consumption of afferent territories reached up to 8.5 million *poods*.[68] Also, the Department of Mining and Salt Affairs ordered the Bessarabian Administration of Saline Lakes '... to enter in correspondence with the heads of the gubernyas, to which Bessarabian salt is exported, so that entrepreneurs engaged in bargaining with Bessarabian salt, for the lack of the last, to buy salt from Crimean reserves, either from Bessarabian' (Гроссул and Будак 1967: 300).

Still, in the opinion of the counsellor of the Administration of Saline Lakes, A. F. Shnabel, the catastrophe of 1850 had also positive effects on lakes, as they were almost exhausted at that time. All the efforts to allow sea water to them had no success and they were slowly drying. From 1854 he expected new yields of salt (Скальковский 1853: 498). Meanwhile, the Russian Government was obliged on 24 February

[66] NARM, F. 241, inv. 1, d. 16, l. 692.
[67] ПСЗРИ (собрание II), том XXVII, 1852, отделение 1, №26125, с. 228.
[68] NARM F. 2 inv. 1, d. 5632, l. 2.

1853 to diminish, until 1 February 1854, the import duties on salt on all terrestrial customs of Bessarabia, from 40 silver kopeks per *pood*, as the Normal Tariff of 1850 provided, to 27 silver kopeks.[69] The outbreak of the Crimean War delayed the restoration of the salt industry in Bessarabia (Гроссул and Будак 1967: 300). Due to acute lack of salt in the province, the diminished import duty for Bessarabia was at first prolonged, by ukase of 5 January 1854,[70] then, by ukase of 25 December 1855, it was even more reduced, to 19 silver kopeks, until 1 January 1857, for all terrestrial and Danubian custom offices of Bessarabia and also the custom of nearby Odessa seaport, from Kherson Gubernya.[71]

After the war, the part of southern Bessarabia where the salt lakes were situated was torn from Russia by the Paris Treaty of 1856. Due to this situation, the reduced duty on importation of foreign salt to Bessarabia of 27 silver kopeks was allowed also for the year 1857,[72] and in short time, *state counsellor* Novoselski was allowed to organize urgently the extraction of salt from Kuyalnik and Khadzhibey Estuaries, near the city of Odessa.[73] In 1882, after in 1878 Russian Empire reclaimed its possessions in the southern part of Bessarabia, the governor of the province pleaded for the restoration of Bessarabian salt industry, arguing that its revival would not ruin the Odessa salt industry, thus revealing the major impediment to its recovery.[74]

Based on examined published and unpublished sources, we conclude that the salt extraction industry in Bessarabia developed in three stages between 1812-1850: 1) 1812-1818 – the saline lakes were given mostly in concession; the production and salt price were set by the concessionaires, with no state tax on salt; 1819-1830 – the extraction entered under state control, private industrialists were extracting salt for a fee, no quantity and price limits being set and no state tax being levied, except when imported to Russian gubernyas; 1831-1850 – the salt production was strictly controlled, the quantity of salt extracted was based on annual limits decided by the Imperial Government, and was performed only for the needs of state reserves, no private industrialists being allowed in business. The salt was wholesaled at the prices fixed by the Imperial Government and was subject to a high state tax.

Being very cheap to produce, with ponds situated near the sea-port of Odessa, the centre of grain exports in Black Sea basin, Bessarabian salt became one the most profitable affairs both for the state and private entrepreneurs on the domestic market. Due to its character of staple commodity for those times, the salt industry of Budjak represented an essential source of revenue for Bessarabia. Similar in all aspects to that of Crimea and for long seen as a major rival to it, the salt of Bessarabia would gradually become a necessary alternative for salt supplies, as the extraction of salt from saline lakes was very weather dependant and thus unpredictable. It would also become an important 'craft' for thousands of peasants and townsmen from nearby areas, involved either in its extraction or transportation.

[69] ПСЗРИ (собрание II), том XXVIII, 1853, отделение I, СПб., 1854, №27044, с. 72.
[70] ПСЗРИ (собрание II), том XXIX, 1854, отделение 1, СПб., 1855, №27835, с. 8.
[71] ПСЗРИ (собрание II), том XXX, 1855, отделение 1, СПб., 1856, №29980, с. 748.
[72] ПСЗРИ (собрание II), том XXXI, 1856, отделение 1, СПб., 1857, №31334, с. 1101-1102.
[73] ПСЗРИ (собрание II), том XXXIII, 1858, отделение 1, СПб., 1860, №33131, с. 587.
[74] NARM, F. 241, inv.1, d. 43, l. 8 verso.

References

Ichim, D. 2006. Exploatarea sării în Moldova medievală [Medieval salt mining in Moldova]. In V. Cavruc and A. Chiricescu (eds.), *Sarea, timpul* şi *Omul*. Sfântu Gheorghe, Angustia.

Tomuleţ, V. 2002. *Politica comercial-vamală a* ţarismului *în Basarabia (1812-1830). Documente inedite din arhivele Rusiei, Ucrainei* şi *Republicii Moldova* [Tsarist custom and trade policy in Bessarabia (1812-1830). Unpublished documents from the archives of Russia, Ukraine and Moldova]. Chişinău.

Tomuleţ V. 2015. *Politica comercial-vamală a* ţarismului *în Basarabia* şi *influenţa ei asupra constituirii burgheziei comerciale (1812-1868)* [Tsarist custom and trade policy in Bessarabia and its influence on formation of commercial bourgeoisie (1812-1868)]. Iaşi, TipoMoldova.

Анцупов, И. А. 1978. *Аграрные отношение на Юге Бессарабии (1812-1870)* [Agrarian relations in the South of Bessarabia (1812-1870)]. Кишинев, Штиинца.

Гроссул, Я. С. and Будак, И. Г. 1967. *Очерки истории народного хозяйства Бессарабии (1812-1861)* [Essays on the history of the economy of Bessarabia (1812-1861)]. Кишинев, Картя молдовеняскэ.

Жуков, В. И. 1964. Города Бессарабии 1812-1861 годов. *Очерки социально-экономического развития* [Cities of Bessarabia in 1812-1861. Essays on the socio-economic development]. Кишинев, Картя Молдовеняскэ.

Зябловский, Е. Ф. 1842. *Российская статистика* [Russian statistics], издание второе, часть I. Санкт-Петербург, Тип. И. Глазунова.

Мунтян, М. П. 1971. Экономическое развитие дореформенной Бессарабии [The economic development of the pre-reform Bessarabia], *Ученые записки Кишиневского университета* 117 (ист.): 4–385.

Свинин, П. П. 1818. *Естественное описание Бессарабской Области* [Natural description of Bessarabia], Отечественные записки 1: 134–187.

Скальковский, А. А. 1849a. Соляная промышленность в Новороссийском Крае (1715-1847) [Salt industry in the territory of New Russia (1715-1847)], статья I. *Журнал Министерства Внутренних Дел* 25: 62–104.

Скальковский, А. А. 1849b. Соляная промышленность в Новороссийском Крае (1715-1847), статья II. *Журнал Министерства Внутренних Дел* 25: 197–218.

Скальковский, А. А. 1850. Опыт статистического описания Новороссийском Края [Essay on statistical description of New Russia], часть. I: *География, Этнография и Народонаселение Новороссийского края* [Geography, ethnography and population of New Russia]. Одесса, Тип. Л. Нитче.

Скальковский, А. А. 1853. Опыт статистического описания Новороссийского Края, часть II: *Хозяйственная статистика Новороссийского Края* [Economic statistics of New Russia]. Одесса, Тип. Францова и Нитче.

From Blessing to Punishment: The Salt Issue within the Romanian Landscape in the 19th Century as Seen by Foreign Travellers

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Abstract

Present and exploited in all Romanian historical provinces, salt represented a natural resource almost unavoidably remarked on by the majority of the foreign travellers who crossed the Romanian landscape. Many of these offered observations regarding the salt sources and the way in which salt was exploited and used. From the testimonies of the foreign travellers in the 19th century, those belonging to German language speakers and French travellers are remarkable. The former emphasized the practical and economic side of the salt sources' valorisation, while for some of the others the ill-treatment of those who had to work in the salt mines represented an issue that necessarily had to be dealt with. In our paper we frame within the specific historical context the most relevant of these testimonies in order to understand the reasons that led those foreign travellers to their points of view.

Keywords: salt, Romanian landscape, foreign travellers, 19th century, salt mines.

As far as one can say, until now there was no emphasis on the importance accorded to salt in the accounts of the foreign travellers within the Romanian landscape in the 19th century. Two groups of foreign travellers have especially drawn our attention – the German-speaking travellers and the French travellers. These two groups not only seem to be the most numerous in the 19th century compared to other ethnic or language groups, but they had rather different approaches regarding the salt issue and the ways in which the salt resources were exploited in the Danubian Principalities and in Transylvania. One of the very detailed accounts of the 19th century that refers also to the importance of salt economically and commercially belongs to the Austrian Joseph Rohrer (1769-1828). As a statistician he wrote several studies and technical papers. In the Romanian region, he visited Bucovina and Moldavia in 1802 and Maramureş in 1809. Following the first trip he published a book in Vienna in 1804 (Rohrer 1804). The most important information therein deals with Bucovina's economic situation at the beginning of the 19th century, especially the salt mines in Cacica, Pleşa, Cârlibaba, and Iacobeni. He offers precise data on the salt exploitation in Cacica, its quality and its importance for the horses of the imperial troops stationed in Bucovina (Rohrer 1804: 53-58; Cernovodeanu 2004: 152).

Another interesting and informative book with regard to the extraction of precious metals and salt in Maramureş and Transylvania was also published at the beginning of the 19th century by Wilhelm Gottlob Ernst Becker, a mining foreman who originated from Freiburg. Unfortunately, only a few things are known about his biography; nevertheless, considering the ideas expressed in his book, one can assume that he was in the service of the Habsburg authorities. This is how we can better explain the thoroughness with which he described the technique used for the mines' exploitation, the rocks' structures and the quality of the minerals extracted. There are also certain observations related to the economic and social situation of the miners, who were mostly Romanians. Becker mentions that the introduction of some measures to improve their working and living conditions might be necessary, but his preoccupation for these aspects rather emphasizes the practical interest of the Austrian state than a genuine concern for the human factor itself (Becker 1816: 126-136; Cernovodeanu 2004: 203).

Count Feodor Káracsay of Valyeszáka (1787-1859), a Croatian officer in the imperial Habsburg army, visited Bucovina and Moldavia twice, the first time in 1814 or 1815, the second time in 1817. His impressions and the information he gathered during his two trips were published in a book that was printed in 1818 in Vienna (Karaczay 1818). The way in which he wrote the book and the particular attention granted to the road network in the Principality of Moldavia would rather suggest a journey with a military purpose, a fact already mentioned in our historiography (Cernovodeanu 2004: 752). Nevertheless, Káracsay's account contains enough statistical data and various comments regarding the economic life, the units of measurement, the demographic structure, the clothing, the manners, and the customs of the inhabitants of Moldavia. As for the salt exploitation, Káracsay considers that the Principality's resources are huge but poorly exploited. He particularly appreciates the salt mines in the Târgu

Ocna region, which 'are famous and supply with salt the South of Poland and Russia'. Regarding Bucovina, he refers to the salt mine in Cacica, considering that the quantity extracted there is 'enough for the domestic consumption needs of this province'. 'However', he continues, 'much Moldavian salt from Tg. Ocna is introduced by smuggling for its better quality'.

At the same time, he describes the salt trade routes for the commerce in Bucovina and also regarding the connections with Galicia and Transylvania.

Another Austrian traveller is Joseph Adalbert Krickel (1791-1847). Unlike Becker and Káracsay, he was a keen observer. The historiography mentions that he travelled on foot more than 14,000km. A graduate of the Faculty of Philosophy in Vienna, he had shown great aptitude for learning foreign languages and studying geography, topography, history, and statistics. As a clerk, he worked in the imperial military structures. He travelled through Transylvania and Banat in 1827/28, and his attempt to see Wallachia was stopped by the outbreak of the Russian-Turkish war of 1828-29. The data he collected and the impressions from his travels were published in 1830, in a book printed in Vienna (Krickel 1830). The description he made is impressive in its details and thoroughness. He is one of the travellers originating from Austria who refer not only to the richness of the salt resources in Transylvania, but also to the curative and medical properties of the salt in here, mentioning, in this context, the Ocna Turzii region. Another area containing important salt resources visited by Krickel was Uioara de Sus; he described in detail the four operating salt mines and the method of extraction.

Another traveller originating from the Habsburg Empire is the Czech Adolf Schmidl, about whom we do not know enough biographical data. It is known that he travelled within the Romanian region sometime after the Russian-Turkish war of 1828-29. He published a book in 1835 about his itineraries in Maramureş, Transylvania, Banat, Moldavia, and Wallachia (Schmidl 1835). Through Schmidl's account interesting details regarding the process of salt exploitation in Maramureş and Transylvania were kept; one can also learn about some technical innovations in the mining process of that time, such as the illumination of the mine in Slatina (Maramureş county) with natural gas in 1826: 'The mine Slatina, three quarters of hour away from Slatina, is interesting due to its illumination with natural gases. In 1826, a draught of carbonic hydrogen which went through a little cavity ingnited in a mine well. They caught it, they instilled it in the whole of the enterprise and the gas has kept until now' (Schmidl 1835: 253). The salt gathered from the mines in Turda and Mureş-Uioara was stored in the locality named Portuş, on the banks of the river Mureş, being transported on its waters to Hungary. Schmidl also shows that the neighbouring locality, Oarda de Sus, was inhabited only by sailors.

Johann Georg Kohl (1808-78), a preceptor and publicist from Bremen, Principality of Hannover, travelled extensively through Europe and Northern America. In 1838 he visited Bessarabia, and immediately after that he travelled through Hungary, Austria, Bohemia, and Banat (Kohl 1842). Originating from Upper Bavaria, Ernst Anton Quitzmann (1809-79) was a military physician and a very talented writer. Captivated by history and mythology, he travelled widely, trying to improve his general knowledge. He passed through the Romanian region (Banat, Transylvania, and Wallachia) in 1846, on his way to Constantinople. The book containing his impressions and memories from there was published in 1850, in Stuttgart (Quitzmann 1850).

The reason for which these two travellers are mentioned together is that their accounts offer very interesting details regarding salt smuggling in the border areas of the Romanian historical provinces. As Johann Georg Kohl showed, at the Danubian military border of the Habsburg Empire, salt was extremely valuable, a fact which was understood not only by smugglers, but also by some of the border guards: 'Here, at the military border, salt is very valuable, while beyond, on the Turkish side, whole charges of Romanian mountain salt are passing in chunks of thick greenish crystal. The border guards look at these crystals with greedy eyes, just like children at sugar candy, and although themselves as faithful soldiers usually stem the salt smuggling, there are still many people through whom sometimes they get something from all this' (Kohl 1842a: 529). The salt smuggling was also mentioned when presenting the area at the Iron Gates, in Banat. The smuggling was carried across the Danube mainly by Romanians, who sometimes used sign language to let each other know what the border guards intended to do: 'Especially here, on the Austro-Serbian Danube, the sign language is widely spread. Naturally, this comes from the fact that people have often something to say as close neighbours and they cannot do that either because of the width of the river or because they are not permitted to go from one to another due to the plague. Moreover, smuggling, which is made here with salt, feeds the sign language' (Kohl 1842b: 25).

Stefan Dietrich, an Austrian military physician, was present in Bucharest during the imperial occupation of the Danubian Principalities in 1854-57. He did not actually write a book, but a report, being asked by a superior officer whose name we do not know. The report was written in 1855 and, as already shown in our historiography, it was one of several meant to properly inform the Habsburg leaders in order to prepare a future annexation of the two principalities, Moldavia

and Wallachia. In this context, the Austrian physician underlines the possible profits that the Habsburg Empire might obtain if the soil and subsoil's resources, including salt, together with the drainage basins of the rivers, could be properly exploited (Buşă 2010: 659).

The first French traveller whom we mention here is Benjamin Nicolas Marie Appert (1797-1873). He arrived in the Romanian region in 1851, with the purpose of examining the medical situation and the detention facilities. He was personally received by the ruler, Prince Grigore Alexandru Ghica, who helped him see the hospitals and the prisons in Moldavia. Benjamin Appert was moved by the situation he met in Târgu Ocna, where many convicts carried out their punishments by working in the salt mines there. The French traveller was profoundly impressed by the conditions in which these individuals had to work and asked the Prince for immediate measures in order to improve their living (Appert 1854: 82-89).

Thibault Lefebvre (birth and death dates unknown), a French attorney and economist, visited Wallachia twice, in 1853 and 1858. He was also shaken by the conditions in which the miners and the convicts had to work in the salt mines in Wallachia. He also presented a financial summary of the salt exploitation, showing that salt was one of the main natural resources that brought profit for the Danubian Principality's economy. Nevertheless, he expressed in a very moving manner the image that some foreigners had after visiting a salt mine within Moldavia or Wallachia: 'The salt mines are the prisons of Wallachia' (Lefebvre 1858: 274).

Joseph Caillat (birth and death dates unknown), a French physician, spent several years in Wallachia, from 1845 until 1848. He came here with the avowed aim of rebuilding his health and, driven by curiosity, wanting to know more about the diseases of this European region. His account was published six years after he returned to France, in the periodical *L'Union médicale* in Paris, and also constituted the subject of a small monograph (Caillat 1854). He offers very interesting data regarding the salt mines in Wallachia, showing that these were actually the biggest in Europe and assured about a quarter from the annual income of the principality. As with the two previously mentioned French travellers, he provides information regarding the conditions in which the convicts had to work in the salt mines. Following his return in France, he sent a memoir to the Wallachian government asking for the abolition of this punishment – sending the convicts to serve their sentences by working in salt mines (Caillat 1854: 80-86).

The accounts and reports of the foreign travellers contribute to the visualization of salt in its natural background, not only from a geographical and geological point of view, but also from an ethnic and historical one, allowing the drawing of some interesting observations that may emphasize the economic and commercial value on one hand and the appreciation it had among the Romanians and other nations on the other. From this perspective, one might develop various analyses of the eating habits, the salt smuggling in the border areas of the Danubian Principalities, Transylvania, Banat, and Maramureş, the share of salt in the whole of the resources exploited and traded, the presence of salt as an ingredient during certain moments of magical and ritual importance etc. Forcing this idea a little, one might even talk about a true salt civilization in certain areas in the Romanian region, with connections that go back for almost two thousand years, in the Roman times, as the Romans were the first who exploited the salt in a systematic and organized manner and at a significant scale in the territory of the former province Dacia.

If other travellers like Italians, British, and Russians usually make rather general observations and descriptions regarding the salt issue and its exploitation, those made by German-speaking and French travellers are different in two aspects. Thus, many of the texts written in German distinguish themselves by a thoroughness of description of soil and subsoil resources and also of their economic and commercial importance. German-speaking travellers are more concerned with the practical, utilitarian side of these aspects, paying attention both to the resources themselves and to the possibilities to improve their exploitation in the interest of profit growth, but also for various military usages. For them, this abundance of salt constitutes a true blessing, as even Wilhelm Becker mentions (Becker 1816: 126), yet this blessing must be seen and understood mainly from an economic and commercial point of view. The human factor of this issue – the miners' and convicts' living and the reasons that caused this – matters less for them. The particular attention that some of the travellers originating from the Habsburg Empire show for the resources of the Romanian soil and subsoil, including here the salt, might be also explained, especially towards the middle of the 19th century, through the existence of the plan of edifying the Empire of 70 million Germans, one of the favourite ideas, for instance, of Karl Ludwig von Bruck (Ghenghea 2013: 215-216).

On the other hand, some of the French travellers referred mainly to the human side of what the process of exploiting the salt meant in that time, starting with the fact that salt was extracted both by miners' and convicts' labours. This particular aspect made a powerful impression on some of them, including for personal reasons, as it is the case of Benjamin Appert, who was imprisoned for about three months in 1822 in France, being accused of helping two political convicts

to escape. The French see in these convicts actual miserable human beings, not simply villains. Perhaps, in a larger context, this attitude might be connected with the past of illuminist essence from the second half of the 18th century or even with the well-known Declaration of the Rights of Man and Citizen (26 August 1789). Excepting the poor work conditions in the salt mines, the only plan that was largely developed by the French travellers' accounts when talking about salt was the commercial one, a fact explained especially after 1829, when the Ottoman commercial monopoly in the trade with the Danubian Principalities was abolished.

The salt issue as a whole presents a particular interest not only for archaeologists and specialists in geology and geography, but also for ethnographers, historians, and other scholars willing to research this area. The accounts briefly presented here might also constitute a solid basis for further studies regarding various aspects connected to the salt exploitation process and the salt value within the Romanian region. In our opinion, this is one of the points of the 19th century travel literature worth exploring in order to better analyse and understand the importance of this element – the salt – for Romania during modern times.

References

Appert, Le C. 1854. *Voyage dans les principautés danubiennes*, Mainz.

Becker, W. G. E. 1816. *Journal einer-Bergmännischen Reise durch Ungarn and Siebenbürgen* II: 126-136. Freyberg.

Buşă, D. (coord.) 2010. *Foreign travellers about the Romanian Countries in the 19th Century*. New Series VI (1852-1856), Bucharest.

Caillat, J. M. 1854. *Voyage médicale dans les provinces danubiennes*, Paris.

Cernovodeanu, P. (ed.) 2004. *Foreign travellers about the Romanian Countries in the 19th Century*. New Series I (1801-1821), Bucharest.

Ghenghea, M.-C. 2013. The Romanians and the Empire of 70 Million Germans. Debates and Reactions in the Romanian United Principalities' Press (1860-1861). Öt Kontinens 2, 2012: 213-224.

Karaczay, G. f. 1818. *Beytraege zur Europaeischen Laenderkunde Die Moldau, Wallachey, Bessarabien and Bukowina Neuste Darstellung dieser Länder, nebst Kupfern verschiedene Trachten derselben vorstellend*. Wien.

Kohl, J. G. 1842a, *Hundert Tage auf Reisen in den österreichischen Staaten*. Dritter Theil. *Reise in Ungarn*. Erste Abtheilung, Dresden und Leipzig.

Kohl, J. G. 1842b, *Hundert Tage auf Reisen in den österreichischen Staaten*. Vierter Theil. *Reise in Ungarn*. Zweite Abtheilung. *Das Banat, die Pusten und der Plattensee*, Dresden und Leipzig.

Krickel, J. A. 1830. *Fußreise durch den größten Theil der österreichischen Staaten in den Jahren 1827, 1828 bis Ende Mai 1829* I. Wien.

Lefebvre, T. 1858. *Etudes diplomatiques et économiques sur la Valachie*. Paris, Seconde édition.

Quitzmann, E. A. 1850. *Reisebriefe aus Ungarn, dem Banat, Siebenbürgen, den Donaufürstenhümern, der Europäischen Türkei und Griechenland*. Stuttgart.

Rohrer, J. 1804. *Bemerkungen auf enter Reise von der Türkischen Granze über die Bukovina durch Ost – und West – Galizien, Schlesien and Mahren nach Wien*. Wien.

Schmidl, A. 1835. *Reisehandbuch durch das Königreich Ungarn mit den Nebenländern und Dalmatien nach Serbien, Bukarest und Constantinopol*. Wien.

Use of Salt in the Christian Church of Late Antiquity: Literary and Archaeological Evidence

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Abstract

Used during religious rituals (baptism, funeral) and medical procedures accompanying the healing process through *incubatio*, salt represented an indispensable element in the meals of Egyptian anchorites and it was mentioned under various forms, such as *sal frictum* (Cassian, *De coenobitorum institutionibus*, XXII), but also as raw material for preparing and curing various marine species, such as sardines (*moenomenia*). Literary sources mention the impressive amounts of dried fish sent by the Alexandria Patriarchate to the Church of the Holy Sepulchre, in Jerusalem (besieged by the Persians). Hence, for the Egypt area, archaeological discoveries and the information provided by *papyri* or *ostraca* confirm the existence of a tradition of fish processing in monasteries (St. Jeremias at Saqqara and the monastery of Bawit). In those monasteries, they traditionally had salted fish (*salsamenta*, *tarichos*) or a fermented fish sauce called *garum*, which was recommended by friar Pahomie in the diet of invalid monks.

The fact that sometimes the Church had access to salt resources, which they could value to their own benefit, is apparent from the Edict issued by Emperor Justinian II in 688; he granted to the Church of St Demetrios in Thessaloniki the right to exploit one of the salt mines (*halyke*) near the city. A letter written by Pope Gregory the Great (599) mentions that in Rome (among the estates owned by a monastery) there was also a salt deposit or a deposit of fruits and vegetables pickled in brine (*salgamum*). In this sense, it is only natural to wonder whether in the province of Scythia (Dobrudja), the placement of monasteries attested at Halmyris (lat. Salmorus) and at Stratonis Turris (modern-day Tuzla; 'tuz' means 'salt' in Turkish) was dictated by the existence of important agricultural, fish, and salt resources.

Keywords: Salt, salt lake, salt mines, monastery, Church, Scythia, Dobrudja.

The present study proposes an introspection into the economy of ecclesiastical communities in Late Antiquity and the early Middle Ages, related to the exploitation of salt resources and to its consumption in various forms. In the Paleo-Christian Church, the Christian status of the ones admitted among catechumens was acquired by receiving a blessing with the sign of the cross, as well as through a series of rituals, such as exorcism and the sacrament of salt, mentioned in the Synods of Hyppo (AD 393) and Carthage (AD 397).[1] 'The salt of the earth' (Matt. 5. 13), 'through its natural importance, symbolizes the effects of the gift received during baptism'(Streza 1973: 687); by becoming 'a healing sacrament meant to drive away the evil enemy', salt 'turns into a token of mercy unto everlasting life' (Streza 1973, 687). According to the texts of *Liber pontificalis*, the tradition of blessing water mixed with salt is a particularity of the Western Church, because the Eastern Church does not admit the use of salt for holy water (Cabrol 1921: 1688). Furthermore, this mineral was also used in the funerary ritual: it was used for embalming the Coptic monks or the lay persons who were in a direct relation with the monastic world, a fact confirmed by the archaeological research conducted at the monasteries of St. Epiphanius (MacCoull 1998: 318, note 43) or Deir-el Bachit. (Lösch *et al.* 2012: 27-41) Concerning the same geographic space – north Africa –, the purifying role of salt is attested during religious controversies among the supporters of Augustine, bishop of Hyppo, and the Donatists of bishop Macrobius. When they came into possession of the Hyppo church (AD 407), the clerics of the latter cleaned the floor of the worship place with brine, in order to cleanse the place where Catholic priests had performed religious services (Humfress 2012: 334; Chadwick 2001: 385).

Over time, illustrious friars and venerable fathers within Egyptian monachism established an 'elaborated diet' that included – alongside bread, wine, or fresh fruits and vegetables – salt-preserved foods. The texts on papyri and ostraca containing expenditures, incomes, profits, and types of products requested or sent by monasteries refer to the salt used in the 'industry' of monastic food preservation. In addition, textual evidence within hagiographic sources – such as *Historia Lausiaca* by Palladius, *The Outline Teaching on Ascetism and Stillness in the Solitary Life* within *The Philokalia* by Evagrius Ponticus,[2] or *Conferences* by John

[1] For an ample discussion on the symbolism and meanings of the term 'salt,' see: Harmless 1995: 80, 150, 189; Van Oort 1991: 29; Rebillard 2012: 42.

[2] Evagr. Pont., *Prakt.* (PG 40: 1255); Waddell 1957: 26: 'If you have bread, salt, or water, you can still meet the dues of hospitality.'

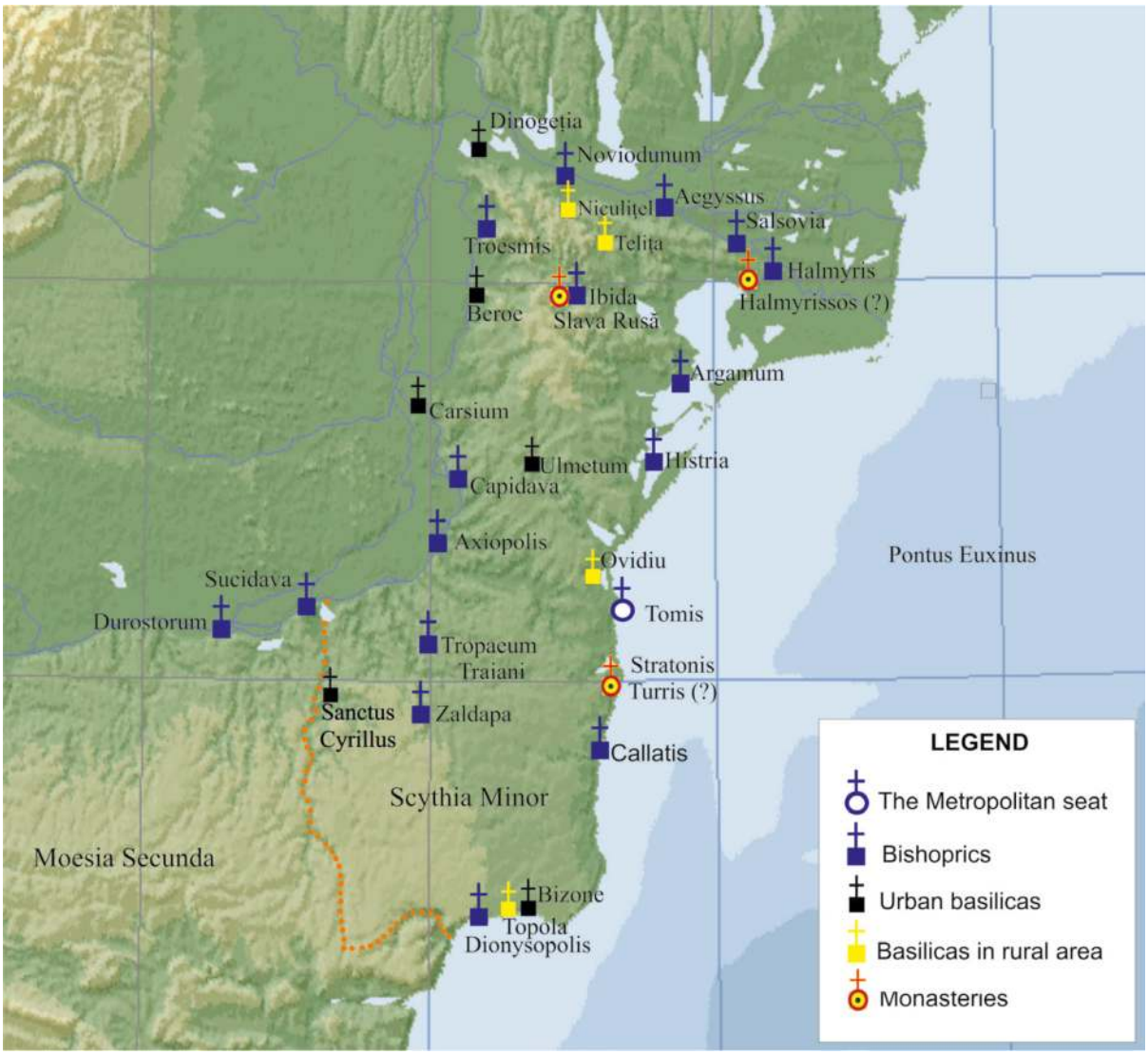

Figure 1. Ecclesiastical centres in the province of Scythia, 4th – 6th centuries AD (Map support: Microsoft Encarta).

Cassian (as well as a series of ostraca discovered during archaeological excavations) – show that the main food of Egyptian anchorites was bread seasoned with olive oil, vinegar, and salt,[3] to which they added vegetables preserved (σύνθετα) in salt or oil (Thelamon 1992: 300; Wipszycka 2011: 148).

This mineral was also included in the list of the main foods recommended to sick people, within the healing process through *incubatio* – a fact confirmed by *Miracula* of Saints Cyrus and John (Caseau 2007: 641). A remedy used for healing people in pain was represented by fish meat (salted and pickled anchovies) (Crislip 2005: 30; 75; 155; note 77.) and derived products, such as *garum* or *liquamen* (λικουάμεν) (Desse-Berset and Desse 2000, 74). In the 4th century AD, the latter was generically called fish broth. In his rules, friar Pachomius allowed only to the sick monks the intake of fish broth (*liquamen de piscibus*). The Shenoute's *Canon* 5 – dated to the end of the 4th century AD and the beginning of the subsequent century – advised the friars of the 'White' Monastery (situated near the city of Sohag in Upper Egypt and named after Saint Shenouda the Archimandrite) to 'eat with the measures laid down for us in our congregation... No omission or additions shall be made, nor shall any extra ingredients be added to them so as to change their recipe, by adding oil to the brined anchovies [or: garum?] or salt or charlock or anything else upon our tables in our refectories, except only in the infirmaries' (Crislip 2005: 75; 178, note 40. See also the translation in Krawiec 2002: 182, note 48). The same monastic rule stipulated as follows: 'When

[3] Jer., *Ep.* 22, 34-36 (PL 23: 64); Sheridan: 167: 'Have gone forth from the cenobia and take nothing with them to the desert except bread and salt'; Cass., *Coll.* 8. 1 (PSB 57: 435): 'We returned to the old man's (Serenus) cell, and enjoyed a most sumptuous repast. For instead of the sauce which with a few drops of oil spread over it was usually set on the table for his daily meal, he mixed a little decoction and poured over it a somewhat more liberal allowance of oil than usual... Then he set before us table salt, and three olives each'.

Figure 2. Lake Sărături and geographical location of the Halmyris city (Map support: Google Earth and https://commons.wikimedia.org/wiki/File:Romania_location_map.svg, May 29, 2016).

Figure 3. View of Kokkino Chorio, near Almyrida (photo taken by the author).

Figure 4. Kokkino Chorio (Crete): Tanks for sea salt production made of rock and cement (photo taken by the author).

Figure 5. Kokkino Chorio (Crete): Tanks for sea salt production (photo taken by the author).

Figure 6. Kokkino Chorio (Crete): Tanks for sea salt production made in holes in rocks (photo taken by the author).

Figure 7. Kokkino Chorio (Crete): Sea Salt (photo taken by the author).

people are sick among us, whether man or woman, and they need to eat in the infirmary, and they request a bit of oil, for anchovy (*jir*) or salt or greens, or any other dish of this sort, they shall give it to them in the correct measure'(Crislip 2005: 21; 155, note 47. See also the translation in Krawiec 2002: 186, note 88). Furthermore, the rules stated by friar Pachomius allowed the intake of fish broth (*liquamen de piscibus*) only by crippled friars, while some monasteries allowed the intake of such products only occasionally, (Cain 2013: 341; Brenk 2004: 458) especially between fasting periods. In this sense, the discoveries of the St Jeremias monastery at Saqqara highlighted ceramic vessels containing traces of such foods (Quibell 1912: 27). The text of an inscription representing a fragment within a collection of medical prescriptions – written on the infirmary walls belonging to the same monastery, using black ink – features salt in the list of pharmaceutical ingredients applied in various treatments, subsequently copied mainly by monastic manuals (Quibell 1909: 57-58, no. 103; Crislip 2005: 34). Among the products purchased by Theban monks, salt was also present along with grains, oil, or wine. This food was also mandatory in the diet of even the most rigorous hermits (Wipszycka 2011: 242). Transported in wicker baskets (Crum and Bell 1922: 88-89 (no.92)) and usually preserved in kitchen containers, salt was consumed as grains (*sal frictum*, ἅλες φρυκτοί), according to John Cassian (Cass., *Inst.* 22 (PL 73, 277)). This preservation method in the kitchen is also apparent in the culinary-inspired speech of friar Palladius, who lived in the 5th century AD, when he was proposed to become bishop: 'I already am [bishop]... In the kitchen and shops, over the tables and pots, I examine them, and if there is any sour wine I excommunicate it, but I drink the good. Likewise, I inspect the pots, too, and if any salt or other spices are lacking, I throw these in and thus season them and eat them. This is my diocese...' (Pallad., *Hist. Lausic.* (PG 43, 10); Palladius, *Lausiac History*, 102).

The need to diversify production among Egyptian monastic communities necessitated that the monks have close contracts with various suppliers. A Coptic ostracon dated to the 6th-8th centuries AD mentions a salt-dealer (νιτροπώλης) named Psynhor, paid by the council of the holy monastery of St Thomas with 1 *solidus*, fodder, and foods in exchange for the salt he brought every month (Crum and Bell 1922: 134-135, (no. 164); Wipszycka 2011: 197). The letters of the Theban anchorite Frange – written on ostraca – date to the same period; Frange asked some monks or certain private persons in the Jeme area to send him various foods, among which was salt (Boud'hors and Heurtel 2010: 103 (no. 103); 225 (no. 326)). According to *The Life of Sammuel of Qalamūn*, in the 6th-8th centuries AD, the exploitation of a salt mine in the Fayyūm Oasis allowed the friars of the Deir-al-Qalamūn monastery to organize quite a profitable salt trade in the Nile Valley. The same literary source mentions that the drinking water in the Fayyūm area was actually very salty, thus not potable and very harmful for sick friars. Armenian documents of 1178 mentioned that the said monastery – in existence until the 15th century– was able to produce 3,000 *artabas* of salt per year (Buzi 2015: 87). An incident that occurred in AD 631 in Egypt confirms the building of monasteries near salt water springs. Hence, in the context of various actions conducted by State authorities and the representatives of Chalcedonian Church in order to dissolve the Monophysite monastery of Sketis, one of the clerics – namely John, a member of the presbytery – tried to hide the monastery's treasury in a salt marsh, but his action was a failure (Wipszycka 2004: 131-132, note 8). In the Syrian space, in AD 594, Athanasius – known as 'Camelarius' (Camel Driver), the future Syrian Monophysite patriarch of Antioch – used camels to deliver salt from the Jabboul Salt Lake, near Aleppo. His monastery, Qinneshrin – situated on the eastern bank of the Euphrates – was approximately 100 km away from that salt lake (Gatier 2001: 98).

Returning to the Egyptian region, a series of ostraca dated to the 6th-9th centuries AD highlight important information concerning the monastery of Bawit (related to fishing activities, salt fish processing, and its distribution by the monks). The monastery had their own equipments, such as fishnets and boats, reason for which the monks bore the name of 'fishermen.' Some written documents – papyri and ostraca – suggest that fish was processed on the monastery estates; it was preserved in pottery vessels and subsequently distributed to monks by superiors or by the administrative personnel of the monastery (Van Neer *et al.* 2007: 152-153). Archaeological discoveries have revealed a significant amount of amphorae from Palestine (LR 7), but also from the Egyptian area (LR 5/6). Initially, they were used to transport wine, but their destination was changed to fish curing (*salsamenta* or *tarichos*) (Van Neer *et al.* 2007: 150 See Boud'hors and Heurtel 2010: 238-239 (no. 348), 412 (no. 773): *tarichos* was a term for salted fish ('poisson en saumure'). In his anecdotes, Synesius of Cyrene relates how he amazed a community by showing them a barrel of salted fish from Egypt: with no access to the sea, they had never seen fish before (Wilson 2004: 148). The fish sauce was preserved in other types of containers, too. The correspondence of Theban friar Frange shows that he asked for a large *ampulla* of fish sauce; this container – also called a *kôthôn* – was a type of flask (Wilson 2004: 21; 70-71 (no. 53)).

A series of *ostraca* discovered at Bawit also indicate the monks' preferences in terms of fish species: Synodontis Schall (χοῖρος) and Labeo from the Nile (Van Neer *et al.* 2007: 153; Clackson 1999: 94-95; Clackson 2002: 6), as well as small Mediterranean fish, such as sardines (*moenomenia*), mentioned by John Cassian in his

Institutions... (*quos apud... pisciculi minuti saliti, quos illi maenidia vocant, summa voluptas est*) (Cass., *Inst.* 4. 22 (PL 73, 277)). The word *moenomenia* comes from the Greek μαινόμενα or μαινίδιον, as the diminutive μαινί means 'small salted fish'(Monks 1953: 353). To complete the information provided above, the Apocryphal Acts (*Actus Petri cum Simone* or *Actus Vercellenses*) mention salted fish (τάριχον) of small size, called *sarda* (σάρδα) (Spittler 2008: 148), which was actually a type of tuna also mentioned by Pliny the Elder in *Naturalis Historia* (Plin., *Nat. Hist.* 32, 151 (229); Spittler 2008: 148, note 95). Freshwater fish represented an important source of protein in the diet of the first Christian communities; it replaced meat during fasting periods and it was less pricey compared to sea fish (Rutgers *et al.* 2009: 1127-1134). In the 7th century AD, the Alexandria Patriarchate sent to Jerusalem affected by the Persian siege 1,000 casks of dried fish provided by Alexandrine fishermen in the Island of Pharos, which included significant amounts of salt. These fishermen may have activated under the control of the Patriarchate, which also managed a large merchant fleet (Monks 1953: 353, note 30).

In the life of Symeon, called *The Fool for the Sake of Christ*, written in the mid-7th century by Leontius of Neapolis, bishop of Cyprus (modern-day Limassol), the author makes allusion to a series of anecdotes about Diogenes of Sinope, a prominent figure in Late Antiquity. While reading or holding speeches in the public squares, he used to eat salted fish, (Krueger 1996, 98, note 28) during his visits to the house of a friend, (deacon Symeon), he ingested large amounts of salted pork meat, which was forbidden to clerics, (Krueger 1996: 99). Furthermore, Symeon offered to the poor or the sick bread, meat, and salted fish (Krueger 1996: 33).

Salt – this essential resource in an agricultural economy – obtained from seawater, salt lakes, and salt mines – was controlled strictly by the State and it was sold through special licensed traders (Vasiliev 1943: 11). In the 5th century AD (553), a famous foam salt jobber (τὸν ἐνδοξότα(τον) ἁλ{λ}ου ἐργολα(β)ον ἀφρ(ου)) named Theodoulos constructed a basilica at al-Rouhhweyb in the Jabal Hass area (modern-day Syria) (Trombley 2004: 77). In September 689 AD, Justinian II Rhinotmetus offered to the Church of St Demetrius in Thessaloniki a salt store (ἁλική, *salina*) situated near the city, owned by the State. The incomes from salt sales were meant to cover the restoration and indoor illumination expenses, as well as other needs of the Church and the clergy (Vasiliev 1943: 7; Bakirtzis 2007: 98). In the opinion of Aleksander A. Vasiliev, the text refers to a salt or house within the city premises Vasiliev 1943: 13). A storehouse (*salgamum*) comprising salt or pickled fruits and vegetables – owned by a monastery in Rome (across the street from it) – is mentioned by Pope Gregory the Great in one of his letters written in April 599 AD: '*Salgamum positum ante portas suprascripti monasterii*' (Leclercq 1950: 587). Attested at Alexandria, Herakleopolis, Corinth, and Thebes, these pickle-sellers (σαλγαμάριοι) also produced and sold various foods pickled in salt, oil, or vinegar, such as meat, fish, vegetables, fruits and spices (Mitthof 2005: 101-104; 176-177 (no. 540); Kenth 1966: 179-180 (no. 551)).

For the West-Pontic area, with which I am far more familiar due to various studies conducted for the area, (Iaţcu 2012: 79-80; 57-60; 80-81) the existence of important agricultural, fish, and salt resources and the influence of Egyptian and Palestinian monachism represented a pattern for choosing the location of certain monasteries (Figure 1). In this sense, I mention Halmyrissos (Ἁλμύρισσος), situated in the rural territory of the Halmyris city (lat. Salmorus, gr. Ἁλμυρίς) (Căţoi 2012; 183-201) and Stratonis Turris (Suceveanu 2009: 247-248) (modern-day Tuzla; 'tuz' means 'salt' in Turkish). In both cases, these were *castella* or *quadriburgia* – fortified monasteries (Băjenaru 2010: 136). In the first case, from an etymological perspective, the term means salt source, salt lake, salt pond, salt water, brine (Căţoi 2012: 194). One of the lakes near the locality of Murighiol (Tulcea county, Romania) – with highly salinized waters – bears the name of Sărături, while Lake Razelm was called Halmyris in Antiquity (Figure 2). A parallel can be drawn to Almyrida,[4] a city on the northern sea coast of Crete, an area today rich in fish and agricultural resources (olive tree plantations), where a 6th-century basilica – decorated with a beautiful pavement mosaic – was discovered (Baldini 2013: 34, Figure 2/3). In this locality and in the neighbouring ones (Kokkino Chorio), local inhabitants still obtain salt using simply devices: small natural and man-made tanks (Figure 3-7). Salt was highly viewed by friars, according for instance to a hagiographic source (*Life of St. Nikon* 22), which mentions that, upon leaving Crete for Epidauros in AD 968, St Nikon the 'Metanoeite' took with him a bag of sea salt (Curta 2011: 218). Therefore, it is apparent that these toponyms attested in Roman Dobrudja are related to economic activities, especially to the production and trade of salted fish.

In the West-Pontic area, both State and Church monopolized the management of these resources, considering that Episcopal centres were also involved in commercial and artisanal activities.[5] The fact that important amounts of salt were used in this area – mostly in the tannery industry – is confirmed by the five funerary inscriptions discovered at Odessos (Varna,

[4] Similar toponyms are encountered in the Egyptian space, too (at Fayoum, Ἁλμυρᾶς ἐποίκιον and Herakleopolis, Ἁλμυρᾶς χορίον), see Cadell 1966: 280.

[5] Jones 1964: 931-932; Besides the San Giusto bishopric (Lucera, Italy), there were workshops and structures used for the treating and processing of sheepskins, see Volpe 2007: 149-156, 160; Volpe and Turchiano 2010: 566-577.

in Bulgaria), belonging to 7th-century AD leather-workers. The city was the most important centre in terms of animal skin processing and export; this was actually the most important local industry (Curta 2011: 125, note 6; Brubaker and Haldon 2011: 480, note 72). Probably also in the capital of the Scythia province, Tomis, leather processing was one of the leading craftsmanship activities; it was closely connected to meat processing, if we consider that a butchers' guild is attested here; in the 5th century AD, this guild was involved in the repair of city walls (Barnea 1979: 70; Popescu 1976: no. 8). Within the technological process applied to animal skin treatment, large amounts of salt were necessary, which could also be brought from Crimea. The letters written by Pope Martin, who was exiled at Cherson – where he died (AD 655/6) – mention salt extracted from the salt mines near the city. Huge amounts of salt were exported by ships, but they were used – according to the same literary sources and supported by archaeological discoveries – for fish processing (Carter and Mack 2003: 86, Figure 8.38). Pope Martin stated that he was able to buy wheat (a highly rare resource in that area and in those times) from the ships, which 'sometimes come in here to leave with cargoes of salt' (Golofast 2003: 112). Salt exploitation activities are also confirmed by the work of Emperor Constantine VII Porphyrogenitus, *De Administrando Imperio*: 'From the Dnieper river to Cherson is 300 miles, and between are marshes and harbours, in which the Chersonites work the salt' (Const. Porph., *De Adm. Imp.*: 42, 120 (185-186)). Furthermore, at Cherson, the processing of fish captured from the Black Sea or the Dnieper delta – in tanks constructed in the 5th and 6th centuries AD – is attested until the 10-11th centuries. The trade with *garum*, salted fish, and salt represented sources of enrichment for the inhabitants of this city (Čechová 2013: 78; Čechová 2014b: 235).

Based on the multitude of literary and archaeological information concerning the foundation of monastic establishments such as those of the Scythia province – an administrative structure situated in the region between the Danube and the Black Sea – the existence of salt resources, besides fish and agricultural resources, represented the main factor in the founding pattern for monasteries. This criterion was still valid many centuries afterwards: in the 14th and 15th centuries, the great monasteries in the modern-day counties of Suceava and Neamţ (Romania) were founded in areas renowned for their salt resources.

Abbreviations

SC = *Sources Chrétiennes* (Paris, 1943-).
PG = *Patrologia Graeca*, ed. J. P. Migne (Paris, 1857-1866).
PL = *Patrologia Latina*, ed. J. P. Migne (Paris, 1844-1865).
PSB = *Părinţi şi Scriitori Bisericeşti* (Bucharest, 1979-).

References

Bakirtzis, Ch. 2007. Imports, exports and autarky in Byzantine Thessalonike from the seventh to the tenth century. In J. Hennig (ed.), *Post-Roman Towns, Trade and Settlement in Europe and Byzantium*, 2, *Byzantium, Pliska, and the Balkans*: 89-118. Berlin-New York, Walter de Gruyter GmbH & Co.

Baldini, I. 2013. Early byzantine churches in Crete and Cyprus between local identity and homologation. *Cahiers du Centre d'Études Chypriotes* 43: 31-49.

Barnea, I. 1979. *Christian Art in Romania*, 1, *3rd-6th Centuries*. Bucharest, Publishing House of the Bible and Mission Institute of the Romanian Orthodox Church.

Băjenaru, C. 2010. *Minor Fortifications in the Balkan-Danubian Area from Diocletian to Justinian*. Cluj-Napoca, Mega.

Boud'hors, A. and Heurtel, Ch. 2010. *Les ostraca coptes de la TT 29. Autour du moine Frangé*, 1, *Textes*. Bruxelles, CReA-Patrimoine.

Bowden, L. Lavan and C. Machado (eds.), *Recent Research on the Late Antique Countryside*: 447-476. Leiden, Brill.

Brenk, B.2004. Monasteries as rural settlements: patron-dependence or self-sufficiency?. In W. Bowden, L. Lavan and C. Machado (eds.), *Recent Research on the Late Antique Countryside*: 447-476.

Brubaker, L., Haldon, J. 2011. *Byzantium in the iconoclast era c. 680-850: a history*. Cambridge. University Press.

Buzi, P. 2015. Early christianity in the Fayyūm: the new contribution of archaeology. *Vicino Oriente* 19: 85-96.

Cabrol, F. 1921. Eau. Usage de l'eau dans la liturgie; eau bénite (*sub voce*). In F. Cabrol and H. Leclercq, *Dictionnaire d'archéologie chrétienne et de liturgie* 4.2, *Domestici-Employé*: 1680-1690. Paris, Letouzey-Ané.

Cadell, H. 1966. Problèmes relatifs au sel dans la documentation papyrologique. In *Atti dell'XI Congresso Internazionale di Papirologia, Milano 2-8 Settembre 1965:* 272-285. Milan, Istituto Lombardo di Scienze e Lettre.

Cain, A. 2013. *Jerome's Epitaph on Paula: A Commentary on the Epitaphium Sanctae Paulae*. Oxford, University Press.

Carter, J. C. and Mack, G. R. (eds.) 2003, *Crimean Chersonesos: City, Chora, museum, and Environs*. Austin. Institute of Classical Archaeology, the University of Texas at Austin.

Caseau, B. 2007. Ordinary Objects in Christian Healing Sanctuaries. In L. Lavan, E. Swift and T. Putzeys (eds.), *Objects in Context, Objects in Use. Material Spatiality in Late Antiquity*: 625-654. Leiden-Boston, Brill.

Căţoi, M. O. 2012. Autour de la localisation du monastère d'Halmyrissos de Vita Sancti Hypatii. *Dacia.* Nouvelle Série 55: 183-201.

Čechová, M. 2013. Food supply from Tauric Chersonesos. *Skyllis* 13.1: 73-80.

Čechová, M. 2014a. Cherson: the develpment of a traditional craft from Antiquity to the Middle Ages. In E. Botte and V. Leitch (eds.), *Fish & Ships.*

Production and commerce of 'salsamenta' during Antiquity. Production et commerce des 'salsamenta' durant l'Antiquité, Actes de l'atelier doctoral, Rome 18-22 juin 2012: 229-236. Aix-en-Provence, Centre Camille Jullian.

Čechová, M. 2014b. Fish products and their trade in Tauric Chersonesos/Byzantine Cherson: the development of a traditional craft from Antiquity to the Middle Ages. In E. Botte and V. Leitch (eds.), *Fish & Ships. Production and commerce of 'salsamenta' during Antiquity. Production et commerce des 'salsamenta' durant l'Antiquité,* Actes de l'atelier doctoral, Rome 18-22 juin 2012: 229-236. Aix-en-Provence, Centre Camille Jullian.

Chadwick, H. 2001. *The Church in Ancient Society. From Galilee to Gregory the Great*. Oxford, Clarendon.

Clackson, S. 1999. Something Fishy in CPR XX. *Archiv* für *Papyrusforschung und verwandte Gebiete* 45: 94-95.

Clackson, S. 2002. Fish and chits: the Synodontis schall. *Zeitschrift* für Ägyptische 129.1: 6-11.

Constantin Porphyrogenetus, *De administrando imperio*, Gy. Moravcsik (ed.). 1967. Washington, Dumbarton Oaks Center for Byzantine Studies.

Crislip, A. T. 2005. *From Monastery to Hospital: Christian Monasticism & the Transformation of Health Care in Late Antiquity*. Michigan, University Press.

Crum, W. E. and Bell, H. I. (eds.). 1922. *Wadi Sarga: Coptic and Greek Texts from the Excavations Undertaken by The Byzantine Research Account*. Copenhagen, Gyldendalske Boghandel-Nordisk Forlag.

Curta, F. 2001. *The Making of the Slaves: History and Archaeology of the Lower Danube Region, c. 500-700*. Cambridge, University Press.

Curta, F. 2011. *The Edinburgh History of the Greeks, c. 500 to 1050: The Early Middle Ages*. Edinburgh. University Press.

Desse-Berset N. and Desse, J. 2000. Salsamenta, garum et autres préparations de poisons. Ce qu'en dissent les os. *Mélanges de l'Ecole française de Rome. Antiquité* 112.1: 73-97.

Gatier, P.-L. 2001. «Grande» ou «petite Syrie Secunde»? Pour une géographie historique de la Syrie intérieure protobyzantine. In B. Geyer (ed.), *Conquête de la steppe et appropriation des terres sur les marges arides du Croissant fertile*: 91-109. Lyon, Maison de l'Orient Méditerranéen-Jean Pouilloux.

Golofast, L.A. 2003. Cherson in the 7th Century AD: The Archaeological Aspect. *Ancient West and East* 2.1: 96-115.

Harmless, W. 1995. *Augustine and the Catechumenate*. Collegeville Minnesota, Liturgical Press.

Humfress, C. 2012. Controversialist: Augustine in Combat. In M. Vessey (ed.), *A companion to Augustine*: 323-335. Oxford, Wiley-Blackwell.

Iaţcu, I. 2012. *Construcţii religioase creştine în provincia Scythia. Secolele IV-VI p.Chr.* Brăila, Istros.

Jean Cassien, *Conférences VIII-XVII*, introduction, Latin text, translation and notes by E. Pichery 1958, Sources Chrétiennes 54. Paris, Éditions du Cerf.

Jones, A. H. M. 1964. *The Later Roman Empire 284-602. A Social Economic and Administrative Survey*, II. Oxford, University of Oklahoma.

Kenth, J. H. 1966. *Corinth VIII/3: The Inscriptions 1926-1950*. Princeton, The American School of Classical Studies at Athens.

Kraviec, R. 2002. *Shenoute and the Women of the White Monastery: Egyptian Monasticism in Late Antiquity*. New York, Oxford Univeristy Press.

Krueger, D. 1996. *Symeon the Holy Fool: Leontius's Life and the Late Antique City*. University of California Press, Berkeley-Los Angeles-London.

Leclercq, H. 1950. Salgamarius (*sub voce*). In F. Cabrol and H. Leclercq (eds.), *Dictionnaire d'archéologie chrétienne et de Liturgie*, 15.1, *Ronchinne-Smedt (de)*. Paris, Librairie Letouzey et Ané.

Lösch, S., Hower-Tilmann, E. and Zink, A. 2012. Mummies and skeletons from the Coptic monastery complex Deir el-Bachit in Thebes-West, Egypt. *Anthropologischer Anzeiger* 70, 1: 27-41.

MacCoull, L. S. B. 1998. Prophethood, Texts, and Artifacts: The Monastery of Epiphanius. *Greek, Roman, and Byzantine Studies* 39: 307-324.

Mitthof, F. 2005. Zwei Mietverträge aus Herakleopolis. *Tyche. Baiträge zur Alten Geschichte, Papyrologie und Epigraphik* 20: 101-110.

Monks, G. R. 1953. The Church of Alexandria and the City's Economic Life in the Sixth Century. *Speculum* 28, 2: 349-362.

Palladius, *The Lausiac History*, translated by R. T. Mayer, 1991. New York, Paulist Press.

Plinius, *Naturalis Historia. Enciclopedia cunoştinţelor din Antichitate*, V, *Medicină* şi *farmacologie*, edited, preface, notes, and index by I. Costa, 2004. Iaşi, Polirom.

Popescu, E. 1976. *Inscripţiile greceşti* şi *latine din secolele IV-XIII descoperite în România*. Bucureşti, Editura Academiei.

Quibell, J. E. 1909. *Excavations at Saqqara (1907-1908)*. Cairo, Institut Français d'Archéologie Orientale.

Quibell, J. E. 1912. *Excavations at Saqqara (1908-1909, 1909-1910)*. Cairo, Institut Français d'Archéologie Orientale.

Rebillard, É. 2012. Religious Sociology. Being Christian in the Time of Augustine. In M. Vessey (ed.), *A companion to Augustine*: 40-53. Chichester, Wiley-Blackewll.

Rousseau, Ph. 2010. *Ascetics, Authority, and the Church in the Age of Jerome and Cassian*. Notre Dame, Indiana, University of Notre Dame Press.

Rutgers, L. V., van Strydonck, M., Boudin, M. and van der Linde, C. 2009. Stable isotope data from the early Christian catacombs of ancient Rome: new insights into the dietary habits of Rome's early Christians. *Journal of Archaeological Science* 36: 1127-1134.

Sfântul Ioan Cassian, *Scrieri alese: Aşezământele mănăstireşti* şi *Convorbiri duhovniceşti*, translated by V. Cojocaru and D. Popescu, Preface, introductory

study and notes by N. Chiţescu. Părinți și Scriitori Bisericești 57. Bucureşti, Editura Institutului Biblic şi de Misiune al Bisericii Ortodoxe Române. 1990.

Sheridan, M. 2007. John Cassian and the formation of authoritative tradition. In A. Camplani and G. Filoramo (eds.), *Foundation of Power and Conflicts of Authority in Late-Antique Monasticism. Proceedings of the International Seminar Turin, December 2-4, 2004*: 157-173. Leuven, Peeters.

Spittler, J. E. 2008. *Animals in the Apocryphal Acts of the Apostles. The Wild Kingdom of Early Christian Literature*. Tübingen, Mohr Siebeck.

Streza, L. 1973. Slujba botezului în ritul liturgic ortodox şi în cel catolic. Studiu comparativ. *Studii Teologice* 25.9-10: 685-697.

Suceveanu, A. 2009. *Opuscula Scythica. Grecs and Romains aus Bas-Danube*. Bucureşti.

Thelamon, Fr. 1992. Ascèse et sociabilité. Les conduits alimentaires des moines d'Égypte au IV[e] siècle. *Revue des Études Augustiniennes* 38: 295-321.

Trombley, F. R. 2004. Epigraphic Data on Village Culture and Social Institutions: An Inetrregional Comparison (Syria, Phoenice Libanensis and Arabia). In W. Bowden, L. Lavan, C. Machado (eds.), *Recent Research on the Late Antique Countryside*, Leiden: 73-101.

Van Neer, W., Wouters W., Rutschowscaya, M-H., Delattre, A., Dixneuf, D., Desender, K., and Poblome, J. 2007. Salted fish products from the Coptic monastery at Bawit, Egypt: evidence from the bones and texts. In H. Hüster Plogmann (ed.), *The role of fish in ancient time. Preceedings of te 13th Meeting of the ICAZ Fish Remains Working Group in October 4th-9th, Basel/ August 2005*: 147-159. Rahden, Verlag Marie Leidorf.

Van Oort, J. 1991. *Jerusalem and Babylon. A Study into Augustine's «City of God» and the Sources of his Doctrines of the Two Cities*. Leiden, Brill.

Vasiliev, A. 1943. An Edict of the Emperor Justinian II, September, 688. *Speculum* 18, 1: 1-13.

Volpe, G. 2007. Architecture and Church Power in Late Antiquity: Canosa and San Giusto (Apulia). In L. Lavan, L. Özgenel and Al. Saranis (eds.), *Housing in Late Antiquity. From Palaces to Shops:* 131-168. Leiden, Brill.

Volpe, G. and Turchiano, M. 2010. The last enclave. Rural settlement in the 5th Century in Southern Italy: the case of Apulia. In P. Delogu, S. Gasparri (eds.), *Le transformazioni del V secolo L'Italia, i barbari e l'Occidente romano. Atti del Seminario di Poggibonsi, 18-20 ottobre 2007*: 531-577. Turnhout, Brepols.

Waddell, H. 1957. *The Desert Fathers.* Ann Arbor, University of Michigan Press.

Wilson, A. 2004. Cyrenaica and the Late Antique Economy. *Ancient West and East* 3.1: 143-154.

Wipszycka, E. 2004. Church treasures of Byzantine Egypt. *The Journal of Juristic Papyrology* 34: 127-139.

Wipszycka, E. 2011. Resources and Economic Activities of the Egyptian Monastic Communities. *The Journal of Juristic Papyrology* 41: 159-263.

The First Systematic Research on the Salt Springs of Bukovina: an Austrian Report from 1783

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Abstract

The aim of this paper is to publish and capitalize a report elaborated in November 1783 by Thaddäus Peithner de Lichtenfels, aulic adviser of the Imperial Court in Vienna, following a visit he undertook to identify the salt springs of Bukovina that would reveal the existence of salt deposits that could be exploited on an industrial scale. To more accurately deliver the perceptions of the Austrian functionary, the focus is on the route and the parameters specific to each spring. Notable are the information of an ethnographic character concerning the exploitation of salt by the locals.

Keywords: brine springs, Bukovina, systematic report, 18th century.

In November 1783, Austrian engineer Johann Thaddäus Peithner Edler von Lichtenfels[1] visits and investigates the salt springs of Bukovina. The findings and results of his journey are put down in a report entitled Journal über die vom 30. Oktober bis 29. November 1783 vollbrachte Bereisung des Bukowiner Landesdistricts und Untersuchung der darin befindlichen Salzquellen, Salzspuren und anderer in das Montanisticum einschlagenden Gegenstände (Fig.1). The manuscript is 27-pages long[2] and accompanied by an annex entitled Haupt-Tabelle über die Lage, den Solenhalt und sonstige Beschaffenheit der untersuchten Bukowiner Salzgebürge und Quellen, wie solche bey der Commissionsbereisung vom 30ten Octobris bis 29ten Novembris 1783 befunden worden (Fig.2), the latter seven pages long.[3] Both documents have never been published before, only mentioned in a few works.[4]

Peithner's Journal is the first detailed work of a scientific nature on the salt springs known by the author, produced following the journey he took in the autumn of 1783 on the order of the Viennese authorities interested in discovering new saliferous deposits that would cover the necessities of the population of Bukovina, and would allow prohibiting the export of salt from the Moldavian mine.

Both the Journal and its annex contain geographical and geological data for each of the visited salt springs, and the information concerning the chemical analysis of their waters, foremost their salinity.

Stating that following an order received from 'the Highest of Places',[5] that is to say from the Aulic Chamber, Section Coinage and Mining, from October 15th, 1783, concerning the inspection and research of the salt springs from the district of Bukovina, Peithner accompanied by an actuary commenced this journey on October 30th, 1783, from Lemberg, passing through Bilka, Gliniani, Olsanitca, Zlotczow, Zborocs, Koslov, Miculince, Chmielowka, Buczacz, Jaslowice, Czapiovicz, and Salesczyski, which are Galician settlements, then entered Bukovina and arrived on the evening of November 2nd in Chernivtsi, where he consulted Gen. Enzenberg, from whom he found that the administration of the region had knowledge of only three salt springs, those from Crasna, Solca and Borderști, respectively.

On November 4th, he departs to Crasna, meeting on the road, at Cuciurul Mare, carters bringing brine for their own use from Crasna. The official experiment with the hydrostatic scale, common in Tyrol, was swiftly performed, showing that the brine had a concentration of 18°.

[1] Johann Thaddäus Anton Peithner, Edler von Lichtenfels (born in 8.04.1727, at Gottesgab; deceased in 22.06.1792, at Viena) was a scientist in the mining field. He studied law and philosophy at the Karls-Universität in Prague, and he obtained his Phd degree in 1750. In 1762, he presented before the Queen Maria Theresa his project to create a mining academy in Bohemia. As a result, the Academy of Metallurgy was set up at the Karls-Universität in Prague, where he was appointed professor. In 1772 he agreed to take over the Chair of Mining Sciences from the Schemnitz Mining Academy, which had been established in 1770. Peithner, who received the title of Counselor of the Imperial Court in 1776, resigned his teaching chair a year later and took over the legal department of the Coins and Mines Section of the Vienna Court. In 1780, he was awarded with the noble title of Edler von Lichtenfels. In 1791, he was named the highest mining official in Austria-Hungary. Peithner has been the author of numerous science publications on mineralogy, metallurgy, and mining. His major work is Versuch über die natürliche und politische Geschichte der Böhmischen und Mährischen Bergwerke, published in Vienna in 1780.

[2] The National Archives of Romania, Aulic War Council Fund, package XIV, document no. 32.

[3] *Ibidem*, document 33.

[4] Mihai Ștefan Ceaușu, *Contribuții la istoricul exploatării sării la sfârșitul secolului al XVIII-lea și în prima jumătate a secolului al XIX-lea în Bucovina,* in 'Suceava. Anuarul Muzeului Județean', vol. IX, 1982, pp. 377-392; Vasile Diacon, *Vechi așezări pe Suha Bucovineană*, Iași, Editura Universității 'Al. I. Cuza', 1989, p. 152 seq.

[5] All the quotes below and lack citations belong to the document at hand, published in the annex of this paper.

On November 5th, at noon, the party reaches Crasna, where the salt spring from Bahna was investigated, meeting 'around 16 peasants from neighbouring villages, with carts and barrels, who collected brine. Some of them had been waiting from three weeks for their barrels to fill, since the discharge of the spring was very low'.

Peithner provides data on the well, which was 'located on a hillock, at approximately 100 feet from the Soloneț River, it is square in shape and 27-feet deep, planked with wood, with just one feet lower not planked. On the right wall of the gallery the compass shows 42° North. On the medical scale there are 12° and on the Tyrolian one 21½°. The cooking salt, extracted on the spot, is of good quality. The brine extracted shows 21½% salt.

The flow of saline water in these wells is approximately five-six buckets in 24 hours, which does not cover the necessities of brine, a reason for which the peasants from around have to wait even several weeks for the necessary brine to collect.

This place deserves attention, says Peithner, both on account of its advantageous position in which it is found, of the concentrated brine, as well as the soil and nature of the mountain, and of the road, which if repaired could become functional, making some recommendations: 'If we were to experiment the obtaining of salt through boiling, here we could raise both the necessary boiling installation and accommodation. But instead of the current well we should dig another, at around 38 mine fathoms and three feet from it and with 104° more towards the North, and another to be dug down to the salt layer and even through it, before here or there the extraction with lye commences. There are trees everywhere around and they could be used for the boiling installation'.

On November 7th, Peithner visits the spring Slatina Vicovul de Jos, from the description of which we learn that 'it is found on the right side of the road, at 344° towards the North, in a curved ravine, approximately 50 mine-fathoms long and 30 fathoms wide, opened towards the road and cut by two small valleys that meet at the middle.

The shaft is planked for a length of five feet and a width of four feet, having a depth of two fathoms and one feet. Its brine contains, according to the medical scale 13½ , according to the Tyrolian one 20°. The resulting salt, which is presented in the annex, is somewhat impure because of the silt running into the well, but it gives 22% in the fire test (...). The situation doesn't seem to provide any special advantage, given that the ravine is tight and the valley, in certain seasons, is very windy'.

The second salt spring visited in Vicovul de Jos was the one from Remezău.

This spring is found in the middle of the forest, in a small ravine, of approximately 15 fathoms in length and 8 wide, washed by small creek, at 340° to the North. Its opening is square and planked up to 4½ feet, and it has a depth of 4 fathoms and 3 feet. The resulting brine had 8½ according to the medical scale and 10° according to the one from Tyrol, the fire test showing 11%, but because of the bad maintenance the salt is not pure. The nature of the soil can be drawn from the supplement no. 4. Because of the narrowness of the mountain area, the perspectives are limited.

The third salt spring, at 1.25 miles from Vicovul de Jos, is called Voitinel. The shaft, square in shape, planked and three fathoms deep, is found in the middle of a wide ravine, opened towards the North, crossed by creeks and found in a small depression having a diameter of approximately 20 fathoms, towards 290° North. The brine has according to the medical scale 14° and according to the one from Tyrol, 21½; the test of fire showed 22% salt. Despite this, because the peasants around have extracted almost all of the brine, the rest being full of impurities, the very small quantity of brine is mixed with heterogeneous substances. Moreover, this place corresponds to a large degree to the expectation of obtaining rock salt.

On the day of November 8th, the commission reached the Sucevița Monastery, where Peithner saw the spring Slatina from Pleșa. The same information as on the other salt springs are provided on this instance. The brine extracted from this source has 12¾ and 16½ according to the medical and, respectively, the Tyrolian scale; the fire test showed a concentration of 19%; the salt is slightly grey, but very tasty.

On the same day the commission investigated the salt springs and wells from the area of the Solca Monastery: Slătioara, then the Slatina Dealu (where there were two shafts the content of which is the same, each having 14 and 20½ according to the medical and, respectively, Tyrolian scale, the fire test produces a salt with a rather pronounced taste at 23½%), those from the placed called Între Pâraie ('between the creeks') ('the springs, of which four are not planked at all, are found in a round ravine. In the brine extracted, the salt scale showed very low, because of the rainwater and the snow already accumulated. Nor was it possible to determine the nature of the mountain soil because of the mud'), after which those from the Trestini forest (several unplanked having according to the medical scale 15½, and to the Tyrolian one 25; the test of fire produced an almost completely white salt, with a good taste, at 25%) and, finally, those from Slatina Mare (There, in a large and gentle ravine, there are five wells planked very crudely, then 20 unplanked sources. The brine extracted had according to the medical scale 14 and the Tyrolian one 19°. The fire test produces an almost white and good salt, of 23½%).

Peithner assessed that 'because of their advantageous position and of the layer of salt found not very deep, all these springs and wells belonging to Solca are promising for an eventual attempt to extract rock salt (...); as the new road will be built not far, favourable prospects will appear for commercialization'.

On November 10th, the commission reaches Bordești, at Slatina de la Runc ('Brine spring from Runc'), the brine of which had according to the medical scale 15°, and according to the Tyrolian one 24°; through the test of fire, a white salt was obtained, of the highest quality, of 25%.

Here, the commission met mountain peasants, who obtained their necessary salt by means of a rudimentary procedure. It is very important to describe the way in which the peasants recrystallized the salt from the brine. This is the first detailed description of this manner of obtaining salt. We know the fact, that the Major Mieg showed in 1776, that at Pârtești the peasants extracted through boiling the necessary salt.[6] Peithner provides additional details: 'From cracked pieces of wood they set-up square pyres, made fire underneath, left it until it burnt with flame, then let the brine obtained from the aforementioned sources to gradually drain on the fire, until the water evaporated, and the salt remained stuck to the wooden pieces. After it cooled, the peasants took the wooden pieces, hit them until the salt fell off, then loaded it into bags and various vessels, and took it home for using it for themselves and their cattle during winter'.[7]

At the salt spring from Cacica, 'instead of planking, a hollowed tree was used,[8] and the resulting brine has according to the medical scale 11½, and according to the Tyrol one, 15; the test of fire produced a white salt, of a particularly high quality' of 18½%.'.

From Cacica, the journey continued to Slatina Mare, where the brine had, according to the medical scale, 13¼, and to the Tyrolian one, 18½; the test of fire produced a good salt, slightly red in colour, of 21%.

On November 11th, the commission reached Stulpicani, at Poiana Slatinei. The brine from this place had 13 and 19, according to the medical and, respectively, the Tyrolian scale; the test of fire produced a not very white, but good salt, of 20%.

The second well from Stulpicani is Poiana Plutonița. The brine from here had 5½ according to the medical scale, and 6¼ according to the Tyrolian one; the test of fire produced a brown, impure salt.

'Here, because the area is very mountainous and inaccessible, it is not necessary to make any attempt'.

The journey continued through Vama and Câmpulung at Iacobeni, where the water of two salt springs that were talked about were analysed not 'as to examine it as a saline solution, but as a spring with healing properties, given that in the peat bog soil there possibly exists liver-of-sulfur'.

On November 14th, the return journey starts, and on November 17th, the party reaches Chernivtsi, whence after a two-day sojourn, on November 20th, it leaves through Zastavna and then through Uście, Skala, Knoroskov, Mikulince, Kozlov, Zborrow, Zlotczow, Gliniani, etc., reaching Lemberg on November 29th.

At the end of his report, Peithner lists the salt springs that were left uninvestigated because of extremely bad weather, 'for keeping in mind': at Vijnița, the springs Hladova and Chrabniza; at Berhomet, the sources Bahnea and Solotvina Mesi Slanczani; at Banilova, the sources Süll and Kosseliuka, from which they collected brine when they visited the Kutti salt spring from Galicia, which according to the medical scale had 6 and 7 and according to the Tyrolian one, 9 and 10¼; at Crasna, the spring Slatina de la Runc; at Vicov, the springs from Lubonca, and from Preluca lui Coroamă, at Sucevița, the spring Slatina de la Proppi; at Bordești, the source Slatina Balta and Slatina Glodului; at Sadova, the source Slatina Măgura Zbranca; at Putilova, the source Sărata.

Moreover, he adds to the annex a table and a map[9] of the Bukovina district with the annotations necessary for a clearer image of his undertaking.

The annex, entitled **Main table on the position, content of salts and other characteristics of the saline mountains and salt springs of Bukovina, as they were ascertained on the occasion of the inspection of the commission from October 30th to November 29th, 1783**, has 15 fields, three of which with subdivisions. The fields are as follows: 1. The name of the districts in which salt springs are found; 2. The name of the main settlements to which the following salt springs belong; 3. The name of the land owners; 4. Distance between the main settlements and Chernivtsi, in miles; 5. The state of the roads and areas leading to these settlements; 6. The name of the salt springs belonging to these settlements; 7. The distance of the salt springs from these settlements; 8. The state of the roads leading to these settlements; 9. The names of the wells or of the salt springs; 10. The position and other information on the state of the salt springs and of the wells; 11. Their depth; 12. The salt content; according

[6] J. Polek, Topographische Beschreibung der Bukowina mit militärischen Anmerkungen von Major Friedrich von Mieg, in Jahrbuch des Bukowiner Landesmuseum, 5, 1897, p. 14.

[7] This description of salt recrystallization is also given by Mihai Ștefan Ceaușu in *op. cit.*, p. 379.

[8] That is to say a hollowed tree trunk (Rmn. *buduroi*).

[9] I have not yet found this map in the National Archives of Romania, in the fond of the Aulic War Council.

to the hydrostatic measurements; 13. Percentages obtained through evaporation; 14. The quality of the salt extracted from the saltwork; 15. The nature of the mountains and of the soil around.

These fields, as can be seen, provide an exhaustive image of the sources of saline water visited by Peithner. Thus, we know that only two salt springs were not found on the land owned by monasteries: the one from Putilova was owned by the village of Putilova, and for the one from Crasna the owners are erroneously stated to be the monks from the Humor Monastery, instead of the Voroneț Monastery, which owned the Stulpicani estate and, accordingly, its salt springs.

With respect to the access routes to the main settlement, ample information is provided. For example, for reaching Crasna, 'the road leads from Chernivtsi through Cuciurul Mare, from Dimca across a marshy field in the valley of the Siret, through Cupca towards Crasna; where the Siret and the Seret over which at that place there are bridges, which had to be crossed several times. At half a mile distance from Crasna, one must cross a lateral valley at the South-West, in which the salt spring from Bahna is found'. And for return, 'From Crasna we took the road back, towards Stârcea, at the national road, and from there we continued over the mountain, through Frătăuți, towards the valley of the Suceava. The Suceava River had to be crossed upstream from Vicovul de Sus, before reaching Vicov'.

Likewise described rather well are the access ways from the main settlement to the respective springs: 'The road from Crasna towards this spring is difficult to get through, since it is very far afield from the valley of the Soloneț and because of the multitude of trees felled by the wind', towards the spring from Remezău one cannot go 'almost on any road, and can barely be reached, along the traces of those that went through there before', and at Sucevița 'to this spring one can go only on horseback', etc.

Information that ease the identification on the field of the salt springs or wells are given: '[the source] is found at half an hour from Jicovul de Jos, the well is found in a small, bent ravine, opened towards the road, crossed by two small watercourses that meet, on the right side of the Băișoara, it is planked for a length of five feet and a width of four. The compass shows 344 North', or '[the source] is found north of Stulpicani, in a ravine crossed by two valleys, the well is planked rectangular, and the spring captured into a hollow tree trunk', and so on.

The depths of the wells is measured in two ways. The Austrian measurement units are rendered with two abbreviations that are not comprehensible.

The salinity of the springs was established hydrostatically using the 'doctor' scale, that is to say the medical scale, and according to the Tyrolian method, while through evaporation the percentage of salt was established. The highest percentages were found at Slatina Dialul, from Solca, specifically 23½, then 23 at Slatina Mare and Slătioara, 22 also at Solca and at Vicovul de Jos.

The quality of the salt was described in terms of 'good salt, white, slightly yellowish'; 'greyish-white, but good'; 'white and good'; 'Because of the foulness of the well, the salt is greyish, but it tastes good' and so on.

In the case of eight springs that were not visited, the reason why they were overlooked is stated: 'Given the particularly harsh, winter weather and the muds from this area (...), as well as the very low productivity of these salt springs, which only have 6–7 degrees, according to the medical scale, and 9–10 degrees after the method from Tyrol'; 'Given its almost inaccessible location and the harsh weather'; 'Because of the remoteness, of the extremely bad roads, and the low productivity'; 'Because of the low content, it is not even worth mentioning'. On November 18th, 1783, General Enzenberg responds to the imperial commissar, the aulic adviser Thaddäus Peithner von Lichenfels concerning the discovery of new salt springs in Bukovina, showing that the land with salt springs is owned by private parties, who did not obtained any profit from their exploitation. He underlines that the salt obtained by boiling brine was imported from Galicia, the salt trade being carried out by Jews at excessive interests.

Peithner von Lichtenfels report was presented to the Aulic Chamber, Section Coinage and Mountain Studies on May 15th, 1784, presenting the overall image of the known salt springs, as the peremptory evidence for the existence of important salt deposits in this region.

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References

Ceaușu, M. Șt. 1982. Contribuții la istoricul exploatării sării la sfârșitul secolului al XVIII-lea și în prima jumătate a secolului al XIX-lea în Bucovina, in '*Suceava. Anuarul Muzeului Județean*', IX: 377-392.

Diacon, V. 1989. *Vechi așezări pe Suha Bucovineană*, Iași, Editura Universității 'Al. I. Cuza'.

Polek, J. 1897. Topographische Beschreibung der Bukowina mit militärischen Anmerkungen von Major Friedrich von Mieg, in *Jahrbuch des Bukowiner Landesmuseum* 5.

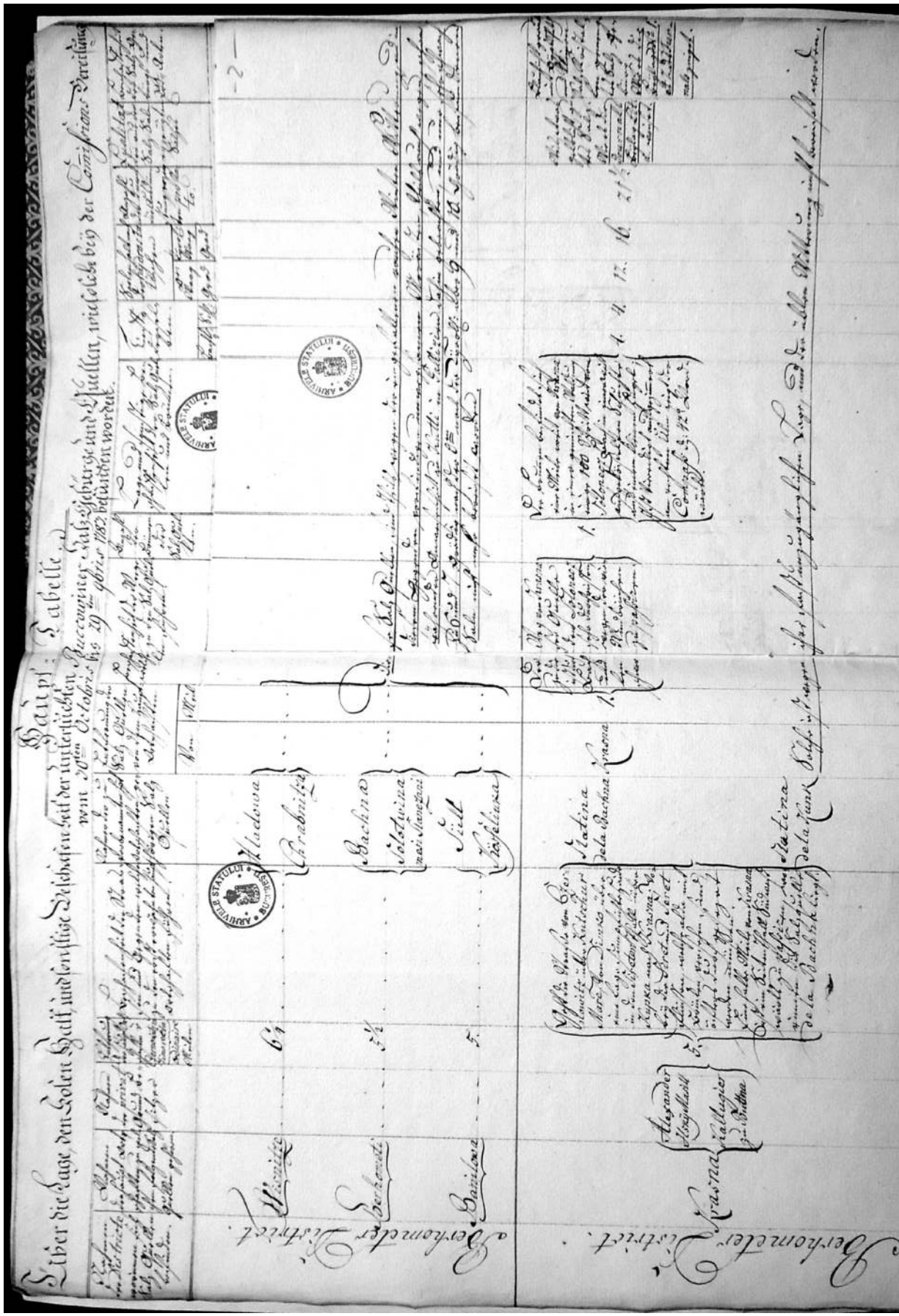

Figure 1. First page of the Peithner. repo

Appendix 1
1784, ad Nm[10] 41

Journal

über die vom 30. Oktober bis 29. November 1783 vollbrachte Bereisung des Bukowiner Landesdistricts und Untersuchung der darin befindlichen Salzquellen, Salzspuren und anderer in das Montanisticum einschlagenden Gegenstände

Infolge eines unterm 15 und präs<entato> 21. Oktober 1783 von allerhöchsten Orten herab gelangten Auftrags, die in dem k.k. Bukowinerdistrict befindlichen Salzquellen zu bereisen und zu untersuchen, trat der Hofrat und Hof Comissarius mit dem ihm beigegebenen Actuarius

den 30. Octobris 1783 diese Reise von Lemberg an und traf über Bilka, Gliniani, Olsanka, Zlotczow, Zborocs, Koslow, Mikulince, Chmielowka, Buczacz, Jaslowice, Czapiowicz und Salesczyki, //

den 2. Novembris des Abends in Czernowitz ein, wo er sonach den folgenden Tag sich zu Einholung einiger Auskünften und anderweitig zu treffenden Vorkehrungen, zu dem administrierenden General von Enzenberg begab und nach der mit diesem gepflogenen Unterredung und erhaltenen offenen Paßport, nebst einem Unteroffizier als Dolmetscher, auf den künftigen Tag die weitere Fortsetzung seiner Reise zu den Salzquellen, deren jedoch die Administration außer jenen zu Krasna, Solka und Bordestie keine zu benennen wusste, bestimmte.

Deme ohngeachtet, ward

den 4. Novembris den Weg über Kutschnur[11] Mare, in der Absicht, die Gebirgsgegenden und Thäler, soweit es die Witterung und Umstände zuließen, nach und nach zu bereisen, auf geratewohl genommen // und da man unweit der Vorspansstation Kutschur-Mare einige mit Fässern beladene Bauernwagen[12] angetroffen und die Fuhrleute bekannten, daß sie Salzsole von Krasna zu ihrem Gebrauche nach Hause führten, so machte man sogleich den behörigen Versuch mit der in Tyrol üblichen hydrostatischen Salzwaage und fande die Sole 18 gradig.

Nach eingeholten Unterricht über die Entfernung und Beschaffenheit der Straße, gieng mal sonach von dem Dorfe Dimko, von der Landesstraße rechts, über eine bei 2 Meilen sumpfigte Heide und gelangte in Sireter Thal, diesen Tag bis Kupka, in ein kleines Dörfchen, wo man bei einem Pontoniers Korporal übernachtete

Den 5. Novembris brach man des morgens von Kupka auf und langte bis Mittag in Krasna an.

Da sich nun aber in Krasna selbst keine Salzquellen befinden, sondern solche und zwar jene // welche Slatina de la Bachna genannt wird, eine starke Meile weit, in einem Seitenthale aufgesucht werden mußte, so wurde auch sogleich die Reise zu Pferde durch eine sehr dichte Tannen-, Fichten und andere gemischte Nadel- und Laubholzwaldung, mit vielmaliger Passierung des Solonecz-Baches, durch lauter Windbrüche, mit vieler Beschwerniß; ungeachtet des schlechten Wegs, traf man doch bei den in einer etwas ansteigenden weiten Schluchte befindlichen Salzbrunnen, bei 16 Bauern aus der benachbarten Ortschaften mit Wägen und Fäßern an, welche die Sole allda abholten und davon einige schon bei 3 Wochen lang auf die Füllung ihrer Fäßern warten, weil der Zufluß der Quelle sehr gering ist.

Der Brunnen liegt an einen kleinen Hügel, einige 100. // Schritt von dem Solonecz Bach entfernt, ist in quadro und 27 Schuh tief, mit Holz ausgezimmert, 1 Schuh tiefer aber ungezimmert. Am rechten Ulm des Schlachtes oder Brunnens zeigt der Kompass den 42 Grad nordwärts. Die geschöpfte Sole hält nach Doktorensalzwaage 12° und nach der Tyrolischen 21½°.

Das sub Lit. A beiliegende, daraus sogleich erzeugte Kochsalz ist von guter Qualität. Die Sole gibt 21½ pro Cento an Salz.

Der Zugang der Sole in diesen Brunnen beläuft sich in 24 Stunden ungefähr auf 5. bis 6. Eimer, und da dieser Brunnen häufig von den umliegenden Bauern besucht wird, so müßen solche, vorgesagtermaßen, auch wohl einige Wochen lang auf das benötigte Sollenquantum warten. //

Dieser Ort verdient überhaupt sowohl wegen seiner guten Lage, der reichhaltigen Sole, und der hier sub Numero 1. et 2. nebengehenden salzigten Erd- und Gebirgsarten, dann des dahin durch einige Reparation wohl herzustellenden Weges, viele Rücksicht.

Wenn man einen Versuch mit Salzsieden machen wollte, wäre hier Gelegenheit, sowohl die nötigen Sudwerks als Wohngebäude zu errichten. Es müßte aber anstatt des bisherigen Brunnens ein, in der Entfernung von dem gegenwärtigen, bei 38 Lachter 3. Schuh nach dem 104° des Kompasses nordwärts, ein anderer Schacht bis auf die Salzlager abgeteuft und auch auf diesem, bevor etwas dies und jenseits ausgelauget werden. Die Waldungen sind ringsherum in der Nähe und könnten // in großer Menge vorfindige Windbrüche bei den Sudwerk wohl gebraucht werden.

Nach diesen in Augenschein genommenen und untersuchten Gegenständen, kehrte man wieder nach Krasna zurück und den folgenden Tag als

den 6. Novembris setzte man die Reise weiter über Kupka zurück, nach Stirze und Fradauz, bis Unter-Wikow oder Dzikow, in Suczawitzer Thale bis in die späte Nacht, fort.

[10] Nm. = Numerum 'the number' (in latin).
[11] This is the way it appears in the text; below is the correct name, Kutschur.
[12] Probable reading.

Den 7. Novembris begab man sich, nach ein so anderen von den Einwohnern eingeholten Auskünften und Anzeigen von dannen, zu der von der Wohnung des Degornik bei welchem man übernachtete, ½ Stunde weit entlegenen Salzquelle Slatina Dzikowolui di Dzooss genannt.

Diese Quelle liegt in einer sich krümmenden, etwa 50 Lachter langen und 30 detto breiten, gegen der Straße zu sich öffnenden, mit zwei // kleinen sich in die Mitte vereinigenden Bächer, durchschnittenen Schluchte, an der rechten Hand fließenden Bächlein, unter dem 344° nordwärts.

Der Schacht ist 5 Schuh lang 4 Schuh breit ausgezimmert und seine tiefe 2 Lachter 1 Schuh. Die darin befindliche Sole hält nach der Doktorwaage 3½, nach der Tyrolischen 20°. Das daraus erzeugte, hier sub Lit. B beiliegende, Salz ist wegen des in die Sole zufließenden Schlammes etwas unrein, hält aber 22. Pro centum in der Feuerprobe. Die gesalzene Gebirgs- und Erdart zeigt sich aus der Beilage Nro 3. Übrigens aber verspricht die Lage keinen besonderen Vorteil zu einem hoffnungsvollen Versuch, da die Schluchte sehr enge und der Bach zu gewissen Jahreszeiten sehr reißend ist.

Ungeachtet hier schon häufiger // Schnee zu fallen anfing, ging man doch zu der in der tiefsten, und wegen der Steinbrüche fast unzugänglichen Waldung, 1. Meil von Unter Dzikow entlegenen Brunnen, Remission.

Dieser befindet sich mitten in der Waldung, in einer kleinen, etwa 15. Lachter langen und 8 detto breiten, mit einem kleinen Bach bewässerten Schluchte, unter den 340° nordwärts. Seine Öffnung ist in quadro, 4½ Schuh weit ausgezimmert und seine Tiefe 4 Lachter 3 Schuh. Die geschöpfte Sole hielt nach der Doctorenspindel 8½ und nach der Tyrol<er> 10., die Feuerprobe erzeigte 11. Pro cento, jedoch aus Ursach der wenigen Säuberung, etwas unreines Salz, wie es die Beilage lit. C zeigt. Die Gebirgsart aber ist sub Nummer 4. beigelegt. Übrigens ist wegen der engen Gebirgslage keine große Hoffnung vorhanden. //

Die 3., von Unter Dzikow 1¼ Meile entfernte, Quelle wird Woidinell genannt.

Die Lage umher ist eine ausgebreitete, mit Bächen durchschnittene, gegen Norden geöffnete Schluchte, vorinnen sich, in einer kleinen, etwa 20 Lachter im Durchschnitt habenden, Ertiefung, unter dem 290° nordwärts, der in Quadro ausgezimmerte 3 Lachter tiefe Salzbrunnen befindet.

Die instehende Salzsole hält, nach der Doktorenwaag 14 und nach der Tyrolischen 20½° und gibt in der Feuerprobe 22 pro cento Salz. Solcher ist aber, wie es die Anlage Lit. D zeiget, aus Ursach, weil die Bauren bevor fast alle Sole zu ihren Gebrauch weggeschöpft hatten, und der daraus entstandene Verunreinigung, der annoch in sehr geringer Quantität inne gewesten Sole sehr mit heterogenischen Teilen gemischt. Die Gebirgsart // zeigt die Anlage Numero 5. Übrigens entspricht dieser Ort der Hoffnung auf Steinsalz sehr stark.

Von Woidinell kehrte man nach Unter Dzikow zurück und setzte noch den nämlichen Tag die Reise über Fradauz nach Radauz fort, wo man Nachtlager hielt.

Den folgenden Tag, nämlich

den 8. Detto, wurde die Reise nach dem Kloster Suczawitza gemacht, wo man sich so gleich nach dem ½ Stund weit von da entlegenen Brunnen Slatina de la Pliessa begab. Dieser viereckigt ausgezimmerte, 2 Lachter 4 Schuh tiefe Brunnen, befindet sich ebenfalls in einer waldichten, nicht grossen, mit einem kleinen Bach durchschnittenen Schluchte. Die ausgeschöpfte Sole hält nach der Doctorenwaag 12¾ und nach der Tyrolischen 16½°. Die Feuerprobe 19 pro cento, etwas graues, aber sehr // schmackhaftes Salz, wie es die Probe lit. E weiset. Die Gebirgsart aber erscheint in der Beilage Nummer 6.

Dieser Brunnen wird wegen seines ziemlichen Zuflusses und der ausgiebigen Sole von den umwohnenden Bauern stark besucht.

Noch eben den selben Tag kehrte man zurück und gieng über Arbori nach dem Kloster Solka, um auch die in dieser Gegend befindliche Salzquellen und -brunnen untersuchen zu können.

Mann begab sich also noch den nämlichen Tag, ungeachtet der rauhesten Schneewitterung, zu den gleich einige 100 Schritte von dem Kloster Solka entfernten Brunnen Slatiora.

Dieser Brunnen liegt in einer sich von dem Mitternächtigen Gebirg gegen die Thal, welches der Solka Bach // bewässert, hereinziehenden Kachel, woraus ebenfalls ein kleines Wasser herabfließet und ist in Quadro, 3. Schuh tief ausgezimmert. Die daraus genommene Sole hält nach der Doctorenwaag 13½ , nach der Tyrolischen 19½, durch die Feuerprobe werden 22 pro cento ziemlich weißes und nur etwas weniges ins gelblichte fallendes, wohlschmeckendes Salz, ut Litera F erzeugt. Die Gebirgsart aber wird sub Numero 7 beigelegt.

Der 2., nach dem Kloster Solka gehörige Brunnen heißt Slatina Dialu und ist ¼ Meil davon entfernt. Die Lage kommt mit der vorerwähnten überein und ist nur dieser Umstand hier zu bemerken, daß sich allda 2, nämlich ein gezimmerter, 1 Lachter tiefer und bloß für den Gebrauch des Klosters Solka gesperrter Brunnen, und weiters, eine // nur 3 Schuh tiefe Salzquelle befindet; die Sole ist von beiden im Halt gleich, und hält nach der Doctoren- 14 und nach Tyrolischenwaag 20½°. Die Feuerprobe erzeugt das sub Lit. G nebengehende, ziemlich scharffe Salz pro 23½ pro cento und die Anlage Nro. 8. zeigt die Gebirgsart.

Übrigens kommt aber bei diesen zween Örtern hauptsächlich zu bemerken, daß sie aus Ursache ihrer guten Lage und des am ehesten zu erschrotterden Steinsalzes, die hoffnungsvollesten sind.

Der 3., nach Solka gehörige Platz, wo sich Salzquellen befinden, heißt Antri Perei. Dieser Ort ist eine halbe Meile von Solka, mehr gegen das nördliche Gebirg, in einer schönen Erlenwaldung gelegen; die Salzquellen selbst, deren 4 ganz ungezimmert sind, befinden sich in einer rundlichten Schluchte, // Die Salzwaage taugte in der geschöpften Sole, wegen des seit langer Zeit schon zugelaufenen Regen- und Schneewassers, ganz unter, und zeigte gar keinen Halt, auch die Gebirgsart ward wegen des vielen Schlams nicht zu bekommen.

Ferners befinden sich bey ¾ Meilen weit von Solka noch mehr gegen das Gebirg in obgesagter Waldung zu Trestini in einer Schluchte an einen kleinen Bach mehrere unausgezimmerte Quellen, die daraus genommene Sole wog nach der Doktorenwaag 15½ und nach der Tyrolischen 25°, durch die Feuerprobe wurden 25 pro Cento fast ganz weißes wohlschmeckendes Salz, ut Lit. H erzeuget; die Gebirgsart aber der zeigt die Beilage Nummer 9.

Endlich gehört annoch zu dem Kloster Solka der Ort Slatina Mare, solcher ist // gegen 1½ Meilen von Solka, gegen das nördliche Gebirg entfernt. Allda befinden sich 5 sehr elend ausgezimmerte Brunnen, dann 20 ungezimmerte Quellen, in einer ausgebreiteten, sanften Schluchte. Die daraus geschöpfte Sole wurde nach der Doctorenwaag 14, und nach der Tyrolischen 19. gradig befunden. Die vorgenommene Feuerprobe erzeugte 23 pro Cento ziemlich weißes, gutes Salz, ut Littera F. Die Gebirgsart aber bezeigt die Anlage Nummer 10.

Bei allen diesen zu Solka gehörigen Brunnen und Quellen ist, wegen ihrer vorteilhaften Lage, gute Hoffnung für einen Steinsalzversuchsbau, wo vermutlich die Salzlager nicht tief liegen und außerdem auch allenthalben ansehnliche Schwarz- und Laubwaldungen von Fichten, Tannen, Weiß- und Rotbuchen, dann Erlen vorhanden sind, vorinnen // sich jedoch so viele Windbrüche finden, daß nur mit größter Fatigue die Gegend begangen werden kann; wie dann auch die neue Straße unweit davon angelegt wird, folglich für den Verschleiß gute Gelegenheit vorhanden ist.

Den 9-ten Novembris wurde die Reise nach Suczawa und

den 10-ten detto bis Bordestie fortgesetzt.

Von Bordestie begab man sich sogleich nach Slatina de la Runk.

Solche ist von Bordestie ½ Meil weit gegen Norden entlegen. Es befinden sich allda, in einer nicht gar zu großen Schluchte, 1 ausgezimmerte und 3 ungezimmerte Quellen. Die darin befindliche Sole wägt nach der Doctorenwaage 15, und nach der Tyroller 24. Das daraus erzeugte 25. Pro Centige Salz ist schön weiß und von // bester Qualität, wie es die Anlage Lit. K weiset. Die Gebirgsart aber aus der Beilag Nro. 11. zu ersehen ist.

Hier muß man den besonderen Umstand anmerken, daß man einige Bauern aus dem Gebirg antraf, die das sub Numero 12. nebenkommende Stück und mehreres zu ihrem Gebrauch bestimmtes Salz folgendermaßen erzeugten: sie richteten sich von in Stücken gespalteten Holz einen viereckigten Scheiterhaufen, schürten unter solchen Feuer, liesen sie in volle Flammen geraten, nahmen dann die Sole aus erst erwähnten Quellen und ließen sie in den brennenden Haufen nach und nach abtröpfeln, das Salz hänkte sich an die Holz Brände und die Bauern namen sodann das ausgekühlte Holz, schlugen // das Salz herab, packten die Säcke und andere Gefäße und nahmen es zum Gebrauch für sich und ihr Vieh bey dem einfallenden Winter, mit nach Hause.

Von Slatina de la Runk gieng der Weg nach Kaziga, und da man während dieser Route in den öfters passierten Solonetz Bach eine ganz schöne, aus kleinen Meermuscheln bestehende Versteinerung antraf, so wird davon zu mehrerer Bekräftigung des Systems das ehemals allda See gewest und die Salzlager ein Werk der Ebbe und Fluth sind, hier sub Numero 13. ein Stück beigelegt.

Die Salzquelle Kaziga ist 3/8 Meilen von Bondestie[13] entfernt. Die Quelle selbst befindet sich in einer kleinen Schluchte, die von dem Solonecz Bach durchschnitten wird. Statt // einer Auszimmerung ist sie mit einem hohlen Baum versehen die darinnen befindliche Sole wog nach der Doctoren, 11½ und nach der Tyrolischen 15°. Die durch die Ausdünstung erzeugten, 18½ pro Cento Salz, sind nach der Anlage Lit. L, schön weiß und von sonstiger guten Qualität. Die Gebirgsart aber zeigt die Beilage Numero 14.

Von Kaziga wurde die Bereisung nach Slatina Mare fortgesetzt. Slatina Mare ist eine ¼ Meile von Bordestie gegen Abend entfernt. Der allda befindliche, viel Lachter 4½ Schuh Tiefe, viereckig ausgezimmerte Brunnen befindet sich in einer kleinen Schluchten die von einem unbedeutenden Bächel bewässert wird. Die aus diesem Brunnen genommene Sole wog nach // Doctorenwaag 13¼ und nach der Tyrolischen 18½.

Durch die Feuerprobe wurde aber 21pro cento gutes, nur etwas weniges in das rötliche fallendes Salz, wie es aus der Beilag Lit. M zu ersehen, erzeuget. Die Gebirgsart zeigt sich abermal durch die Anlage Numero 15.

Diese Gegend ist aber, sowie Solka, mit Waldungen versehen, jedoch die Zufuhr etwas beschwerlicher.

[13] The author writes sometimes *Bondestie*, sometimes *Bordestie*. The *Bordesti* form is valid.

Von danen wurde eben denselben Tag auch die Rückreise nach Suczawa vorgenommen und den folgenden Tag, als

den 11. Novembris, über Kapokodrului nach Humori, in den Moldauer Thal, und von da bis Stulpikani, mit großer Beschwernis, fortgesetzt, um auch die in dieser Gegend gelegene Salzquellen untersuchen zu können.

Die erste hierher gehörige // Quelle heißt Slatina Pojanna. Solche ist von Stulpikani 1/4 Meil gegen Mitternacht gelegen. Es befindet sich allda 1 ausgezimmerter, ein Lachter 2½ Schuh tiefer Brunnen, dann eine in einen hohlen Baum gefasste Quelle, in einer von zwei Bächern durchschnittenen Schluchte, wo der Zugang aber nur zu Fuß und mit äußerster Mühe geschehen kann.

Die daraus genommene Sole, wog nach der Doctorenwaag 13 und und nach der Tyrolischen 19°. Durch die Feuerprobe wurden 20 pro Cento nicht gar weißes, jedoch gutes Salz erzeuget, ut Lit. N, und die Gebirgsart lässt sich aus der Beilage Numero 16 ersehen.

Die 2. nach Stulpikani gehörige, Quelle heißt Poiana Platonica und ist von Stulpikani gegen Morgen ½ Meile entfernt und der Zugang fast unpaßierlich. Die allda befindliche // 2 Schuh tiefe unausgezimmerte Quelle liegt in einer kleinen waldigten Schluchte, die von dem Platonica Bach[14] mitten durchschnitten wird. Die daraus genomme Sole hielt nach der Doctorenwaag 5½ und nach der Tyrolischen 6¼ . Die Feuerprobe zeigte 6½ pro Cento, nach der Beilag Lit. O, ganz braunes, unreines Salz und die Anlage Nro 17. zeigt die Gebirgsart.

Hier ist wegen der sehr gebirgigen und unzugänglichen Lage kein Versuch zu wagen.

Von dannen kehrte man wieder nach Humori zurück und reißte weiter über Wama bis Kimpolong, um die folgenden Tage auch die bei Jakubenj, an der goldenen Bistritz, worfindig sein sollenden Quellen untersuchen zu können.

Den 12. November setzte man die Reise weiter fort und besuchte das, gegen 1 Meile aus dem Wege gelegene, Fundo Moldawaer gewerkschäftliche Kupferbergwerk nach dessen beschehen Befahrung und Beaugenscheinigung der Tagrevier man wieder zurückkehrte, und auch das an der Straße gelegene k.k. Passoritter Kupferbergwerk befuhr und die diesfalls nötige Auskünfte einzog, sich aber sonach aber über Buttna nach Jakubenj begab.

Den 13. Novembris beaugenscheinigte man sowohl das zu Jakubenj befindliche Eisenwerk, als die dazugehörigen Werksgebäude, auch die allda existieren sollende 2 Salzquellen (deren sich eine an der Straße gegen den Eisenbergwerk und die andere an der Landstraße, am Fuße des Buttnaer Berges befindet). Das darausgenommene // Wasser ward nach denen damit vorgenommenen Chymischen Versuchen zwar nicht für eine Salzsole, sondern für eine im Torfgrund vorstoßende Schwefelleber hältige Gesundheitsquelle anerkannt.

Und da man nun weiter in dieser Gegend keine Versuche mehr vorzunehmen hatte, weil sich daselbst schon das höhere Gebirg gegen den Kukurazo zu erheben anfing, auch die eingefallene äußerst üble Witterung nichts mehr zu veranlassen gestattete, so begab man sich

den 14. Novembris auf die Rückreise und lagte

den 17 Novembris zu Czernowitz an, wo man, nach einem zweitägigen Aufenthalt, die weitere Reise

den 20. Novembris gegen die nordöstliche Gegend dieses // Landesdistricts über Sastawna antrat, und weil von Salzquellen weiter nichts zu beobachten war, über Uscie, Skala, Knoroskow, Mikulince, Koslow, Zborrow, Zlotczow, Gliniani etc. fortsetzte, jedoch wegen der äußerst üblen Witterung, erst

den 29. Novembris in Lemberg eintraf.

Endlich muß man nur noch anmerken dass man zu leichterer Übersehung aller vorerwähnten Salzquellen, ihrer Lage und Beschaffenheit den hier nebengehenden tabellarischen Auszug verfasste, so wie man auch zu Übersehung sowohl der angeführten, als auch noch mehrerer existierenden unbeträchtlicheren und wegen äußerst üblen Witterung nicht untersuchten Salzquellen (als zu Wisnitze, die Quelle Hladowa und Chrabniza zu Berhometi die Quellen Bachna und Solotwina Mesi Slanczani, // zu Banilowa, die Quellen Süll und Kosseliuka von welcher man schon bei Bereisung der Saline Kutti in Galizien die Sole hinüber kommen ließ und solche nach der Doctorenwaag 6 und 7 nach der Tyrolischen aber 9 und 10¼; zu Krasna die Quelle Slatina de la Runk. Zu Wikow oder Dzikow die Quellen dela Lubonka, und de la Priluczik a la Koroma, zu Suczawitza die Quelle Slatina de la Proppi, zu Bordestie die Quelle Slatina Balta und Slatina Gloduli, zu Sadowa die Quelle Slatina Magur Szebrank; zu Puttilowa die Quelle Serata) und der von dem Commissario gemachten Reise nebengehende mit dem behörigen Anmerkungen versehene Karte des k.k. Bukoviner Landesdistrict verfassen ließ.

Thad<däus> Peithner
Edler von Lichtenfels
Hofcommissariusactuar
(The National Archives of Romania, Aulic War Council Fund, package XIV, document no. 32.)

[14] This is the way it appears in the text!

Appendix 2

Haupt-Tabelle über die Lage, den Solenhalt und sonstige Beschaffenheit der untersuchten Bukowiner Salzgebürge und Quellen, wie solche bey der Commissionsbereisung vom 30ten Octobris bis 29ten Novembris 1783 befunden worden (cf. p. 384-386)

Namen der Districte worinnen sich Salz-Quellen befinden	Namen der Hauptortschaften zu welchen folgende Salzquellen gehören	Namen der Privatgrundbesitzer	Entfernung des Hauptortschaften von Czernowitz in lima recte ordinaire Meilen	Beschaffenheit der Straßen und Gegenden welche zu den erst erwähnten Hauptortschaften führen	Namen der zu vorbenannten Ortschaften gehörigen Salzquellen	Entfernung der Salz-Quellen von den Hauptort-schaften		Beschaffenheit der Wege welche zu den Salzquellen führen
						von	Meilen	
Berhometer District	Wischnitze		6 ¼		Hladowa Chrabnitza	Diese Salzquellen sind theils wegen der dahin gebrachten, und nur sehr schwach		
	Berhometi		5 ½		Bachna Solotwina mesi Slanezani			
	Banilowa		5		Süll Köseliuka			
Berhometer District	Krasna	Alexander Hsky Masill Kallugier zu Buttna	5	Geht die Strasse von Czernowitz über Kutschnur Mare, von Dimko über eine Lag von sumpfichte Heide in den Sireter Thal über Kupka nach Krasna; vorbey die Siret und Seret fliessen, welche allda mit Brüken versehen, sind öfters durchgesetzet werden müßen. Eine halbe Meile von Krasna ist ein Seitenthal südwestwärts zu passieren, worinnen die Salzquelle de la Bachna liegt.	Slatina de la Bacha	Krasna	1	Der Weg von Krasna zu dieser Quelle ist durch den Solonecz Bach sehr durchrissen und wegen der vielen Windbrüchen schwer zu passieren.
					Slatina de la Runk			
Dzikower oder Wikower District	Unter Dzikow oder Wikow	Kallugier zu Buttna	6	Von Krasna ward der Weg zurück auf Stirze an die Haupt-Landstraße genommen, und von dannen über das Gebürg, im Szuczawaer Thal über Fraducz fortgesetzt, der Suczawa Fluß mußte vor Ober Dzikow oder Wikow durchgesetzet werden ehe man nach Unter Dzikow kam	Slatina Dzikovului di Dzos	Unter Wikow oder Dzikow	¼	Von Unter Dzikow ist guter Fahrweg zu dieser Quelle
					Remession	Detto	1	Fast gar kein Weg und nur mit vieler Mühe zu Fußen von der Vorgehenden zu dieser Quelle zu kommen
					Woidinell	Detto	1 ¼	Der Weg von Unter Dzikow zu dieser Quelle ist zwar nur ein bloser Waldweg, theilsorten etwas sumpfigt, könnte jedoch leicht vollkommen zugerichtete werden
					Slatina de la Lubonka Slatina de la Priluczin Ala Koroma			
Wikover oder Dzikover District	Suczawitza Kloster	Kallugier daselbst	7 ¾	Von Unterdzikov über Radautz neben den Suczawitzer Bach fort, bis Suczawitza ward guter Fahrtweg angetroffen	Slatina de la Pliesa	Suczawitza	¼	Von Suczawitza zu dieser Quelle kann man nur zu Pferde kommen
					Slatina de la Ploppi			

[1] Inexistent word, probably corect auffgekesslten ‘with deep hollows’.
[2] Unknown symbol.

	Anzahl der Brunnen oder Salzquellen	Lage und sonstige Beschaffenheit der Salzquellen und Brunnen	Tiefe derselben		Solenhalt nach der hydrostatischen		Anzahl der durch die Ausdünstung erzeugten pro Cento	Qualität der aus der Salzsole erzeugten Salzes	Beschaffenheit der Salzgebürgs und Erdarten
			Lachter	Schuh	Dr. Waag Grad	Tyrol Grad			
eingefallenen rauhen Winterwitterung und in diesen Gegenden vorfindigen unwegsamen Morästen, theils auch wegen schon währenden Anwesenheit zu Kutti in Galizien zu 6 und 7 grädig nach der Doctoren nach der Tyroler aber 9 und 10 grädig befundenen Sole nicht mehr bereiset worden.									
	1	Der Brunnen befindet sich eine Meile weit von Krasna in einer gemischten Waldung, einige 100 Schritt weit vom Solonecz Bach in einen weit aufgekösselten[1] Schluchte, auf einem kleinen Hügel â; ist viereckig ausgezimmert ,am rechten Ulm zeigt der Kompass, 42° nordwärts	4	4	12	16	21 ½	Weiß, etwas gelblich, gutes Salz, wie es die Journals Beilage a weiset	Blaulichgrau, Gypsspat und kleinen Salzkrystallen gemengtes Salzgebürg, wie es die Beilagen 1 und 2 des Journals zeigt.
Solche ist wegen ihrer fast unzugänglichen Lage und üblen Witterung nicht bereiset worden									
	1	Liegt eine halbe Stunde von Unter Dzikow, der Brunnen befindet sich in einer kleinen sich krummenden gegen den Weg zu geöffneten, mit zwei kleinen zusammenfließenden Wässern durchgeschnittenen Schluchte an den rechts laufenden Baischoara an, ist 5 Schuh lang und 4 breit ausgezimmert, der Compass zeigt den 344ten nordwärts	2	1	13 ½	20	22	Wegen Unreinigkeit der Brunnen rötlichgrau, jedoch gut schmackhaft, ut Lit. B	Graue thonigte und gipsigte Seitengebürg, mit vielen kleinen Salzkristallen ut No. 3
	1	Dieser Brunnen liegt mitten in der Waldung in einer kleinen mit einem seichte Bächel durchschnittenen Schluchte unter den 340° nordwärts und ist in Quadro 4 ½ Schuh weit aufgezimmert.	4	3	8 ½	10	11	Detto ut Lit. C	Detto ut No. 4
	1	Die Lage umher ist eine ausgebreitete Schluchte, in welcher sich in einer kleinen Ertiefung der in Quadro ausgezimmerte Brunnen unterm 29° nordwärts befindet, umher wird die Lage von kleinen Bächen bewässert und mit Waldungen eingeschlossen	3	–	14	20 ½	22	Braungrau wegen Unreinigkeit der Sole, jedoch gut schmackhaft ut Lit. D	Gelblichtgrau tonigtes Seifengebürg (brecie) mit angeschossenen Salzkristallen ut No. 5
Diese 2 Salzquellen sind wegen ihrer Entlegenheit, dann äußerst üblen Wegen und Unbeträchtlichkeit nicht bereiset worden									
	1	Liegt in einer kleinen waldigten Schluchte neben einem kleinen Fächel, und ist viereckig ausgezimmert	2	4	12 ¾	16 ½	19	Weißlich grau, jedoch von gutem Geschmack ut Lit. E	Gelblich graues thonigtes Saifengebürg mit angesessenen Θ[2] Cristal ut No. 6
Diese Quelle ist wegen Geringhältigkeit gar nicht zu erwähnen									

Namen der Districte worinnen sich Salz-Quellen befinden	Namen der Hauptortschaften zu welchen folgende Salzquellen gehören	Namen der Privatgrundbesitzer	Entfernung des Hauptortschaften von Czernowitz in lima recte ordinaire Meilen	Beschaffenheit der Straßen und Gegenden welche zu den erst erwähnten Hauptortschaften führen	Namen der zu vorbenannten Ortschaften gehörigen Salzquellen	Entfernung der Salz-Quellen von den Hauptort-schaften		Beschaffenheit der Wege welche zu den Salzquellen führen
						von	Meilen	
Wikover oder Dzikover District	Kloster Solka	Kallugier daselbst	8 ¾	Von Suczawitza über Arbori nach Kloster ist der Weg ziemlich gut	Slatiora	Solka	1/8	Der Weg von Solka ist sehr gut
					Slatina Dialu	Solka	¼	Der Weg von Kloster Solka dahin ist sehr gut
					Antri Perei	Solka	½	Einen Mittelmäßigen Fahrweg
					Trestini	Solka	3/4	Ist nur zu Pferd zu kommen
					Slatina Mare	Solka	1 ½	Der Fahrweg ist äußerst schlecht und kaum zu Pferd zu zukommen
					Slatina de la Runk	Brodestie	½	Ist nur zu Pferd zu kommen
	Brodestie Kloster	Kallugier zu Humori	9 ½	Von Solka nach Brodestie kann man nur beschwerlich über das Gebürg zu Pferde kommen, man ging also bevor nach Szuczawa und von dan-nen über Ballosan bei etwas besseren Weg, dahin	Kaziga	Brodestie	⅜	Der Fahrweg ist von dem Solonecz Bach ganz verdorben
					Slatina Mare	Brodestie	¼	Dahin geht ein bloser Flußsteig
					Slatina Balta Slatina Glodului			
Câmpulung Moldovenesc	Stulpikani	Kallugier Humori	11 ¾	Von Brodeşti mußte man wieder zurück nach Suczawa und auf der Landstrasse über Capo-Kodrului neben den Maldau[5] -Fluß nach Humori, von dannen aber mit vieler Beschwerlichkeit, theils zu Fuß, theils zu Pferd über das Gebürg nach Stulpikani	Slatina Pojana	Stulpi-kani	¼	Ist nur zu Fuß oder mit vieler Beschwerlichkeit, zu Pferd zu kommen
					Slatina Pojana Platonica	Stulpi-kani	½	Ist fast ganz unzugänglich
	Măgura Szebrank Hudweide	Kallugier zu Humori	10		Slatina Magura Szebranck	Diese konnte wegen		
Russisch Kimpo-longer District	Putilowa	Der Gemeinde zu Putilowa	10 ½		Serata	Ist ganz an den Confinien		

[3] Uncertain lecture.
[4] Possibly incomplete.
[5] This way it appears in text, correct is *Moldau*.

Anzahl der Brunnen oder Salzquellen	Lage und sonstige Beschaffenheit der Salzquellen und Brunnen	Tiefe derselben		Solenhalt nach der hydrostatischen		Anzahl der durch die Ausdünstung erzeugten pro Cento	Qualität der aus der Salzsole erzeugten Salzes	Beschaffenheit der Salzgebürgs und Erdarten
		Lachter	Schuh	Dr. Waag Grad	Tyrol Grad			
1	Dieser Brunnen liegt in einer von Mitternacht gegen das Thal herum gerissene Fächel[3] worinnen ein kleines Wäßerl herabfließet, und ist viereckig ausgezimmert	–	3	13 ½	19 ½	22	Etwas gelblicht, gut schmackhaftes Salz ut Lit. F	Sehr salzigt mit Steinkohlen Spuren gemischet, braunlicht graues Saifengebürg, ut No. 7
Ein Brunnen und eine Quelle	Die Lage ist wie jene der vorgehenden, nur ist der Brunnen zu dem Gebrauch von Solker Kalugier gesperret, die Quelle aber ganz ungezimmert und unbedeckt	1	3	14	20 ½	23 ½	Detto ut Lit. G	Detto, ohne Steinkohlen, etwas gelblichter ut No. 8
4 Quellen	Liegen gegen das nördliche Gebürg in einer mit schönen Erden Waldung umgebenen ausgekesselten Schlucht. Sind ganz ungezimmert. Die Sole kann aber wegen des vielen zufließenden Regenwaßers und Schlams nicht gebraucht werden	–	–	–	–	–	–	–
Mehrere Quellen	Liegen ebenfalls in erst gesagter Erdenwaldung in einer Schluchte an einem kleinen Wasser und sin durchaus gezimmert	–	–	15 ½	25	25	Graulichweiß, jedoch gut, ut Lit. H	Schwarzgrau mit vielen Gewäch-steilen gemischtes salziges Seifengebürg
5 Brunnen und 20 Quellen	Liegen in einer sanften mit mehreren Waßerquellen durch-schnittenen Schluchte, und drängen sich überall hervor[4]	Von 1 bis 5					Detto, ut Lit. I	Lichtgrau, aber ohne Gewächsen, ut No. 10
1 Brun-nnen und 3 Quellen	Liegen von Brodestie gegen das nördliche Gebürg in einer kleinen Schluchte an einem Bach, der Brunnen ist gezimmert, die Quellen aber ganz offen.	–	1⅛	15	24	25	Gelblich weißes gutes Salz	Derberes schwärzlich graues mit crystalisierten Salzspat vermischtes Seifengebürg ut alleg. No. 11
1 Quelle	Diese befindet sich in eine Schluchte die von dem Solonecz Bach durchschitten wird und ist, statt der Auszimmerung, mit einem holen Baum versehen	–	–	12 ½	15	18 ½	Weiß und gut, ut Beilage Lit. L	Blaulichgraues, mit Gips gemischtes salzigstes Seifengebürg, ut Nr. 14
1	Dieser viereckig gezimmerte Brunnen befindet sich in einer kleinen Schluchte, neben einem unbedeutenden Wässerchen	–	4 ½	13 ¼	18 ½	21	Gelblichtweißes Salz, ut alleg Lit. M	Derberes, schwärzlich graues mit cristalisierten Salzspat vermischtes Saifengebürg ut alleg. No. 15
Solche sind wegen Unzugänglichkeit und sonstige Geringhältigkeit nicht bereiset worden								
1 Brunnen und 1 Quelle	Ist von Stulpikani gegen Mitternacht in einer von 2 Bächen durchschnittenen Schluchte gelegen, der Brunnen ist viereckig ausgezimmert, die Quelle aber in einem holen Baum gefaßt	1	2 ½	13	19	20	Schwarzbraunes, erdigtes Salz ut Lit. O	Mit Gips und und Sandstein gemischtes graues gesalzenes Saifengebürg, ut Nr. 17
1 Quelle	Von Stulpikani gegen Morgen in einer kleinen waldigten, von dem Platonica Bach durchschnittenen Schluchte gelegen, und ganz ungezimmert	–	2	5 ½	6 ¼	6 ½	Schwarzbraunes erdigtes Salz , ut Lit O	Mit Gips- und Sandstein gemischtes graues gesalzenes Seifengebürg, ut No. 17
der strengen Winterwitterung und sonstigen Unzugänglichkeit nicht bereiset werden, ist auch dem Vernehmen nach, unbedeutend.								
der Buccowina, Galizien und der Marmarosch in hohen Gebürge gelegen, konnte also eben bey damaliger Witterung nicht untersucht werden								

Ethnography, Ethnoarchaeology, Ethnohistory

Anthropological Studies of Salt in Mexico in the Last 20 Years: An Overview

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Abstract

This paper outlines the background of research on anthropological salt studies in Mexico, as well as its major projects in the past twenty years. The main trends have been defined based on studies of regional history, and other efforts have started from archaeology, and ethnographic, and anthropological research. However, almost always the issues related to the exploitation and use of salt have been complementary to other initial scholarly interests with which it is associated, such as gastronomy, social organization, agency studies, landscape, exchange, symbolism, tradition and social change. There is not yet a specialization in this subject despite the large number of vestiges of salt exploitation in different periods of the past that exist in practically all territories, as well as present-day locations of salt production by traditional methods. Here, I present a summary of the major studies on salt anthropology in Mexico and the current perspectives of these studies.

Keywords: Anthropology of Salt, Archaeology of Salt, Salt History, Mexico.

Previous studies of salt in Mexico

During the last two decades, studies of a historical, anthropological, or archaeological character related to the production and use of salt in Mexico, in the past as well as the present, have experienced a notable diversification of analysis topics and methodologies. The trends do not appear to follow a single pattern, but it is clear that there is greater interest in approaching the topic of salt and saltworks than in former times. In fact, this field of study has experienced at least four periods of academic production in the twentieth and twenty-first centuries, which I shall try to review here in a synthetic way.

The obligatory reference to make in any sort of study about salt in Mexico is Miguel Othón de Mendizábal's monumental *Influence of Salt on the geographical distribution of the indigenous groups of Mexico*, published for the first time in 1928 and expanded in 1946 (Mendizábal 1928, 1946a, 1946b). This work is a collection of essays by this author in which he synthesizes data contained in the Geographical Relations of the sixteenth century and other sources of colonial origin. Mendizábal departed from the notion, accepted by him, that there was a physiological need for the consumption of salt, and that this was the reason for its presence in different styles of life (nomadism and sedentarism) and different diets (subsistence patterns). Without a doubt, one of his greatest contributions was the organization of data on the location of the saltworks into a map that offers a panoramic view of their presence in Mexico. In the final parts of his study, he elaborates on topics such as technological changes that occurred since the Spanish conquest in the sixteenth century, and the cultural and gastronomical relationship between salt and chilli. Nevertheless, the most interesting parts of the work are his observations concerning the distribution of linguistic groups throughout the territory and its implications. Mendizábal affirmed that the movements of Mexico's ancient populations were determined by what he called 'saltwork toeholds'. This constituted an important working hypothesis that had to be considered by other researchers who came after him.

Unfortunately, and inexplicably, for thirty years most historians who dealt with pre-Hispanic cultures, including archaeologists, did not follow up on Mendizábal's work, during which time it was taken for granted that the work was conclusive. In fact it was merely the introduction that showed the general direction of a topic with enormous potential in Mexico.

Over the course of many years in the twentieth century, from the decade of the 1940s (Apenes 1943, 1944; Noguera 1943, 1975) to the start of the 1970s (Charlton 1969, 1970; Mayer-Oaks 1959; Nunley 1967; Tolstoy 1958), new archaeological data appeared occasionally for the center of Mexico that suggested an intensification in the production of salt in that region, evidenced especially by an increase in a type of ceramic associated with the acquisition of igneous salt. This brought briefly renewed interest and generated some archaeological studies on the subject (Baños 1980; Sánchez 1984; Quijada 1984; Sejourné 1970, 1983; Talavera 1979). At the same time it failed to have a permanent impact on academics dealing with the ancient history of Mexico. At the start of the 1980s, an important work of historical

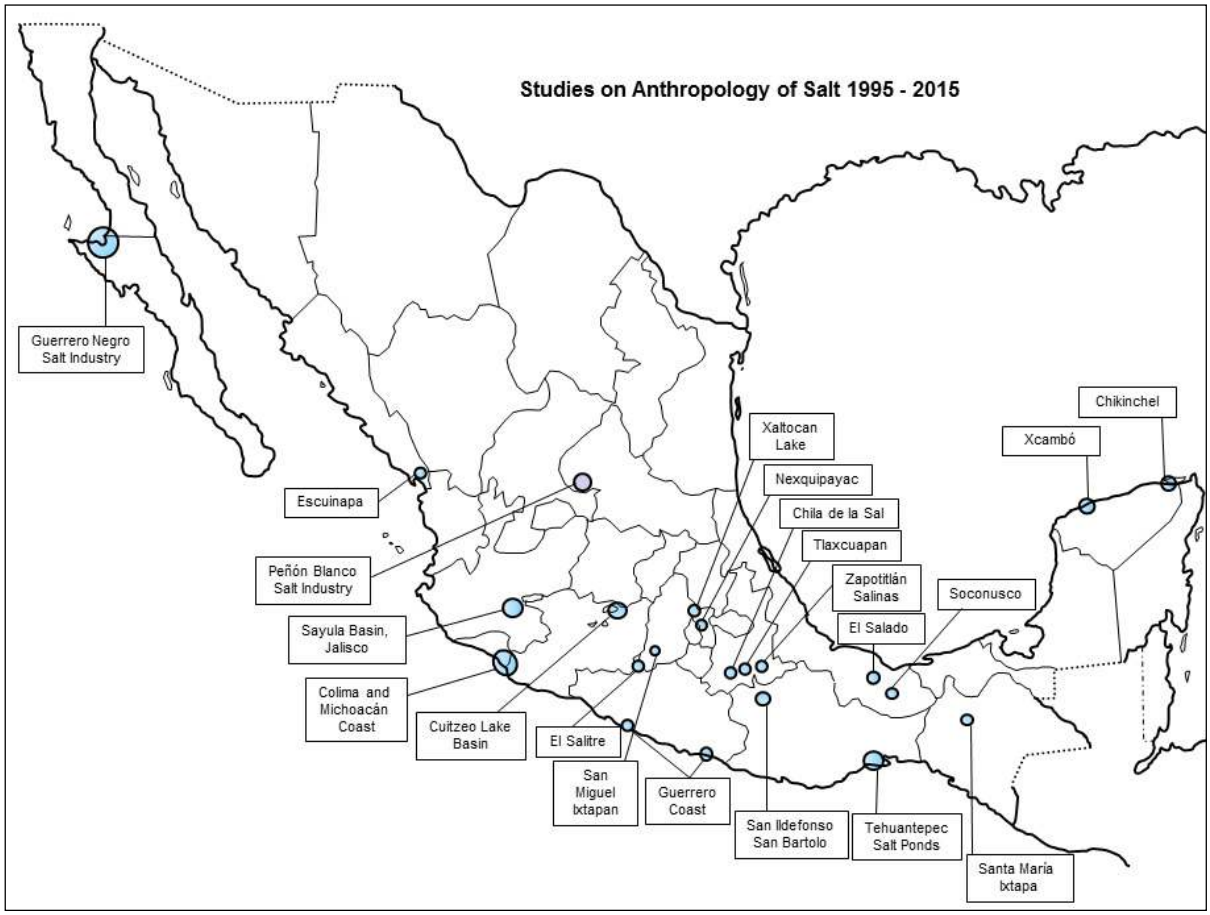

Figure 1. Map of Mexico showing the location of salt works mentioned in the text.

synthesis regarding the salt industry in Mexico from 1560 until 1980 was published (Ewald 1985), as was another for the Maya area (Andrews 1983). Ten more years then went by with little activity, and it was not until the celebration of two Mexican Congresses on this subject in 1993 and 1995 that a second revitalization of research on salt in Mexico took place (Reyes Garza 1995, 1998). On these occasions there was the foresight to summon historians, anthropologists, archaeologists, and even specialists in the natural sciences interested in expanding on a topic that is so abundant in this country. After these meetings, some researchers continued to pursue their interests in this area with studies focused on different regions, times, and issues (Castellón 2008a, 2008b; Vázquez 2008; Williams 2003), including a superior work on the history of salt in the center of Mexico (Parsons 2001), one on the west (Liot 2000), and another on the Maya area (McKillop 2002).

Over the last two decades, the growth in academic interest in salt has been gradual yet constant, without many far-reaching projects but with an ever growing acknowledgement of this being a significant trend in archaeological and anthropological research. While academic publications since the beginning of the twenty-first century have thus far been relatively few they have become more frequent, as can be seen in proceedings of academic meetings, articles in specialized magazines or journals, and some recent theses. Here, I present a review of the most relevant anthropological as well as archaeological and historical research on salt in Mexico that has developed over the last fifteen-to-twenty years. While some of these endeavors have concluded, others continue to generate new studies.

Projects from the beginning of the twenty-first century to the present

In order to more effectively show the research trends involved in each project, I offer a brief description of its objectives and make some observations on its accomplishments (Figure 1).

Historical studies of salt

Beginning in 2006, David Vázquez Salguero undertook the organization and rescue of the archives of the saltworks of Peñón Blanco in San Luis Potosí, which were greatly important during colonial times (Vázquez

2008a, 2008b, 2008c). The publication of the *Guide to the Historical Archive of the Saltworks of Peñón Blanco, 1713-1945* that resulted from this work makes available valuable information for our understanding of the historical development of these salt-producing facilities which produced great quantities of salt for silver mining during the vice-regal period and which are still in use. Currently, this archive, one of the most extensive and best documentary resources for the industry in Mexico, resides in the town of Salinas de Hidalgo, San Luis Potosí, in the house built by the Errazu family in the nineteenth century, who were proprietors of the Peñón Blanco saltworks during the second half of that century.

In 2007 Laura Machuca's study of the salt trade in the region of Tehuantepec, in the south of Mexico, was published. This research focused on control of the salt trade by elite indigenous caciques and some Spanish officials up to the eighteenth century, when it was passed on to the royal administration. The author uses various archives in Mexico, Guatemala, and Spain, and in a very important way recreates the salt routes. Linking family histories, especially those of the merchants and their lifestyles, to this activity, Machuca reveals a very wide and complex landscape of social relations generated by the trade in salt, all within the context of the imperial system.

Studies about salt, ceramics, and briquetage

In the region of western Mexico at the end of the twentieth century, a substantial study was conducted in the Basin of Sayula, in the State of Jalisco, which in its southern part has areas of lakes where conditions favored the production of salt with the help of clay vessels of various shapes and sizes. In the 1990s, Catherine Liot undertook the most complex study of ancient salt production in this part of Mexico. Her investigation included reconstructions of the ceramics employed at various times, as well as geologic, climatic, and chemical analyses and archaeological and ethnographic comparisons with other well-documented cases. Her reconstructions of the function of the vessels used to boil saltwater are very important, as she also identifies some partially excavated mechanisms in the ground used to decant and filter the saltwater, as well as the stoves where the brine was boiled. All of Liot's results are impeccably illustrated and supported by graphs and lab results, making this one of the most solid and modern contributions to studies of salt in Mexico. The results of this research were published in a substantial report (Liot 2000), followed shortly thereafter by further reflections and a synthesis (Liot 2002).

At the beginning of the twenty-first century, Robert Santley (2004) worked at the site of El Salado, previously studied by Ceja Tenorio (1998), in the lowlands of the coast of the Gulf of Mexico. Santley focused on the distribution and use of ceramics in the production of salt at this site. Based on a careful surface survey, he identified areas of different concentrations of activity according to the presence of ceramics. His aim was to determine the methods of salt production at El Salado during two different periods of use, one earlier, dating from the Olmec period (1400-300 BC), and another many centuries later from the late Classic period (AD 650-1000). The first of these performed solar evaporation in shallow trays, and the second cooked the salt to concentrate the brine which was later transformed into salt cakes. Here an uncommon approximation of the function of the vessels is presented in the face of what is a very common scenario in archaeological studies: how to understand the evolution of salt production methods through the use of ceramic vessels when these were discarded in the same place centuries apart, forming great quantities of seemingly mixed waste? Santley's solution was to create maps of the performed sampling, and to recover the most common ceramic forms in order to make proposals concerning their use. Another problem generated by this type of site is noted in the recent review by Ceja Acosta (2016), who considers that while the trays are well adapted to solar evaporation, the narrow pots can only be used to concentrate the brine, but not to produce solid salt. Without a doubt, the approaches to this site, whose sources of salt are springs which have changed their flow over time, will continue to provide more discussions and proposals over the next few years.

The present author (Castellón 2016) addressed these same problems, now moved to the mountainous zone of the Mixteca, in the south of the state of Puebla. This research project, which was carried out from 2003 until 2015 dealt with ancient saltworks in the southern part of Puebla and nearby areas in Oaxaca, and with evidence at these sites of the use of ceramic molds. The result has been the reconstruction of the complete process of production of 'salt cakes,' used as tribute sent to the Aztecs in the fifteenth and sixteenth centuries, prior to the European presence. The study is focused on the technology of salt cakes involving the use of briquetage, and on related matters, such as production scale. The study encompasses social organization, symbolism, exchange, and the technological innovations that took place during the transition from the pre-Hispanic period to the Colonial period with the introduction of new methods (Figure 2).

The region of Zapotitlán Salinas is an excellent place where salt production is represented throughout a long period of time. My investigation there has also led me to start an inventory of ancient inland salt production sites. These are sites I have visited that still produce salt, which show evidence of ancient briquetage in the surrounding mountainous areas, and where there is as

Figure 2. Zapotitlán Salinas, Puebla. Excavation of a fireplace for cooking of brine by using clay supports or briquetage *in August 2005 (Photo by B. Castellón).*

yet no archaeological documentation. It is possible that the Zapotitlán area was a small part of a wide system of salt production based on saline springs that was developed particularly during the centuries prior to European contact and which at certain times yielded salt formed into different shapes by means of differently shaped clay moulds, which indicated their areas of origin.

In 2008, a thesis was presented that dealt with archaeological research at Nonoalco, a site north of Mexico City where a large deposit of clay moulds of types associated with salt production was found. This study focused on the function of these molds, which is an old problem in the archaeology of Central Mexico (Ruiz 2008). In 2009-2011 John Millhauser, in his work at San Bartolo Salinas in central Mexico, re-examined the form and function of clay molds associated with 'salt cakes' production. The investigation included, as well, the organization of salt production technology between the fourteenth and seventeenth centuries in this community. His investigation focused on the floodplains of Lake Xaltocan, which were an important ancient source of salt and which are threatened today by urban development (Figure 3). The result was Millhauser's doctoral dissertation, a very extensive work centered on the identity of this ancient salt working community during the sixteenth century at the time of European contact. In particular, chapter eight of the dissertation is a significant study of the production technology for ceramics specialised for salt and salt cake production, a problem that has been of interest in Mexico since the mid-twentieth century. Millhauser's studies make it clear that salt workers had changing strategies to produce the ceramics depending on the flow of the lakes and the demand for salt, but in general they managed to integrate a style of ceramics that is recognized at a regional level (Millhauser 2012). Other aspects of his research are aimed at determining the effects of the high degree of salinity present in the archaeological ceramics of the Xaltocan region north of Mexico City in relation to salt production (Stoner et al. 2014).

Finally, there were efforts of archaeological salvage starting in 2007 in the region of Xaltocan, where more salt production sites were registered, including documentation of salt production sites north of the town of Ecatepec, about which general information has been provided (Gamboa 2007; Robertson and Gorenflo 2008).

Figure 3. Saltworking station in Lake Xaltocan in November 2010. Area of activity littered with debris of fabric impressed vessels (Photo by B. Castellón).

Ethnographic studies related to boiled brine

In the town of Soconusco, Veracruz, on the coast of the Gulf of Mexico, Ceja Acosta, over the course of the first two decades of the twentieth century, carried out an ethnographic study with archaeological implications (Ceja Acosta 2007, 2008, 2011, 2016). His research includes social organization and salt production processes based on concentrated brine, as well as ritual attitudes and the production of exchange goods in the form of salt cakes in a contemporary traditional community. For many years, during the month of May, the inhabitants of this community set themselves up for several weeks in a sort of camp around a water well with high concentrations of salt. It is quite possible that a saline dome or subterranean diapir around which underground water is concentrated in the period prior to the rains exists in this area. The people who have dedicated themselves to this activity since ancient times establish strict rules of access to the water, since according to them, a being which grants them this gift for which they must show respect and gratitude dwells in the well. Their method of extracting the salt consists simply of boiling the water which, after four hours, crystallizes into a pink-colored salt that is then placed in cotton blankets hung like a hammock (Figure 4). Of particular importance is the fact that a second quality of salt called 'samo' is also produced, for which it is necessary to slowly heat the natural brine in tin containers for two days, hanging the cans over hot coals (Figure 5). Other products consisting of blocks of compacted salt can be created later as special gifts for ritual occasions. Salt is a seasonal product for the economic benefit of the community, but the time of its production also creates a social environment of great integration, which is important for our understanding of the social relations of other traditional and ancient salt producers.

In a similar vein, there exists a community in the mountainous region of Chiapas in the south of Mexico where saltwater is obtained from wells, and later the brine is boiled to obtain solid salt. This is Santa María Ixtapa, an indigenous community that since ancient times has traded this salt with other important regional centres in the heart of Chiapas, such as Zinacantan and San Cristóbal. Ethnographic works from the twentieth century that document the lifestyles of these communities (Vogt 1969) emphasize the importance of salt production, particularly in relation to ritual aspects of the use of water and the production of salt. Somewhat later in the last century these resources were also approached from an archaeological point of view in studies that relied as well on ethnographic documentation (Andrews 1983: 56-62; McVicker 1974), since that small-scale salt production had by then lost importance. Be that as it may, the main product of this zone is a block of compacted salt called '*benequen*' similar to that which is produced on the Gulf Coast. This is compacted salt into sewn palm leaf bags resulting in blocks of salt that are stable, although not entirely solid. Fortunately, local people still produce this salt

Figure 4. Soconusco, Acayucan, Veracruz. Drying salt in boiling brine camp in May 2007 (Photo by B. Castellón).

Figure 5. Soconusco, Acayucan, Veracruz. Drying of salt called samo by using tin cans hanging over burning coals (Photo by B. Castellón).

Figure 6. Salt cakes called 'benequenes' in Santa María Ixtapa, Chiapas. (Photo by courtesy of Luca Rinaldini).

cake, as has been documented in recent years by the outstanding photographer Luca Rinaldini (2016), who is interested in saltworks in various parts of the world (Figure 6). His persistence is yielding a valuable record for comparative studies of salt technology, a topic which is in need of the participation of more specialists.

Studies concerning the lixiviation of inland saline soils

Without a doubt, the use in the past of soils of a particular quality for the production of salt by means of lixiviation is a technology that is now difficult to recover. A very valuable example representing the continuation of a centuries-old saltworking tradition in central Mexico survives in the small town of Nexquipayac, east of Mexico City. Various authors (Alexianu *et al.* 2008; Anaya 1995; Apenes 1943, 1944; Noguera 1944, 1975; Samper 1997) have documented this place, threatened today by modernization and the construction of a new airport. However, the seminal study of Nexquipayac and the saltworking tradition in central Mexico was carried out by archaeologist Jeffrey R. Parsons (2001) after a toilsome, decades-long investigation that concluded with a stay of several months, in 1988, with Nexquipayac's last surviving salt workers in order to closely observe their methods. This monumental research is in the trend of 'archaeological ethnographies' which has come into vogue in various countries (Hamilakis and Anagnostopouolos 2009) as an approach to the recovery of technologies in danger of disappearing. The result in this instance is a meticulous synthesis of every step taken to produce various types of salt from soils obtained on the shores of old Lake Texcoco. Every stage of this complex process is documented to the fullest extent, from the acquisition of the soils, to the construction of the clay filter, the mixing of soils, their placement in the filter, the measuring of necessary quantities, the boiling process for the resulting brine, the drying of the salt, and its uses (Figure 7).

This saline soil-washing process was used intensively during the last period of pre-Hispanic occupation and was particularly important to the economy of the Aztecs and other peoples who lived near the lakes that once covered the land now occupied by the present city of Mexico. According to documents from previous centuries, this tradition continued all the way form the sixteenth into the twentieth century and then began to decline with urban growth and access to industrial salt. Technological changes are clearly reflected in the materials and artefacts used during different times, but the main procedure requiring much specialised knowledge of the local environment has remained the same as in ancient times. Parsons has made a very important contribution to the study of ancient technology and other matters related to this method of salt-making that is in danger of disappearing, which should be an example for new researchers (Parsons 1989, 1994, 1996, 2006, 2008, 2010). At the same time, Parsons' studies have stimulated complementary research on the ancient salt trade in the center of Mexico (Danielewski 1993; De León 2009; Minc 1999).

Figure 7. Nexquipayac, State of México. Pouring salt water in clay filters filled with salty soils during August 2008 (Photo by B. Castellón).

Another study of this same technique of using saline soils was made in the west of Mexico near Lake Cuitzeo, Michoacán, by Eduardo Williams (1999, 2003, 2008) beginning over twenty years ago. In this case, the technique requires the construction of a very large filter made of wood in which the soil is placed. Before, the soil is gathered from an area close to a lake where salts and other lixiviated minerals were concentrated. Local people still practice this process on the eastern shores of Lake Cuitzeo, a body of water which is a part of the lacustrine basin of Michoacán. Apparently, this technique has pre-Hispanic antecedents and one of the local characteristics is the use of a 'canoe' or hollowed tree trunk into which the saltmakers place the brine obtained from the filter to crystallize the salt through solar evaporation. The result is a salt of a brown, white or yellow color, currently used for gastronomic ends and the making of cheeses. The author describes the saltmaking 'factories', which include the formation of mounds of dirt, nearby water wells, canals, a high mound where the filter is placed, and the canoes in which the salt is crystallized. Williams' investigation focuses on the levels of salt production at each factory and includes a comparative study of the artefacts from the Michoacán location with those used in other regions of Mexico. Williams is also interested in the commerce of salt and its economic importance in ancient and modern times, and he later made a wider study of the resources of the lakes in this part of Mexico, their forms of exploitation and subsistence, and the cultural expressions of their ancient and modern inhabitants (Williams 2014).

In 2009, as part of the acknowledged general effort to define future research questions, the author of the present article and Victor Osorio made several visits to the southwestern part of the State of Mexico, in the region of Tierra Caliente, in order to observe some traditional salt production practices. This led to our preliminary documentation of the site of El Salitre, located in the State of Guerrero, in a zone that is a depression in the middle of a mountainous region. An old woman in El Salitre produced salt by the soil-leaching method, improvising a small filter made from a sheet-metal vat with holes in the bottom that was placed over some pieces of wood to drain the water (Figure 8).

Figure 8. El Salitre, Guerrero. Small filtering mechanism for leaching of salty soils in March 2009 (Photo by B. Castellón).

This rudimentary device, however, follows the same principles as other filters made from clay or wood, documented in other parts of Mesoamerica. The previously selected saline soil is placed inside the metal container and is washed with water that flows from one of the small saline springs that are plentiful in this location. The resulting brine is collected in a plastic tub and is subsequently cooked for several hours in a double clay oven. The result is a very white salt that without doubt was known in this area from very ancient times. Large mounds of washed dirt seen around the town which contain many fragments of clay pots, surely used during the pre-Hispanic period, confirm this antiquity. Just as in other cases, this activity is threatened with disappearance by the lack of interest from younger generations, indicating an urgency to perform new studies to recover valuable information (Osorio 2000).

Finally, it is important to mention the existing data for the site of Lambityeco in the central valley of Oaxaca, where salt production technology included washing saline soils to obtain concentrated brine, which was later boiled in clay containers to be crystallized. The ideal conditions, including the presence of springs, swampy land and saline soils, are still present in this part of Oaxaca and were doubtless exploited in the pre-Hispanic era between AD 650 and 850. Clear evidence of saltmaking has been found in the excavations of this site, which also revealed very sophisticated architecture that sheltered a local elite. Some of these results derive from the decade of the 1970s (Peterson 1976) and have since then been published again with more precise archaeological information to document the changes in technology and in the organization of housing units dedicated to this activity (Lind and Urcid 2010: 49-65).

Studies concerning the lixiviation of saline soils in coastal areas

For many years, the great driving force behind the study of salt in Mexico was our late friend Juan Carlos Reyes,

Figure 9. Lagoon of Cuyutlán, Colima. Large filtering mechanism abandoned in May 2006. The salty soils were loaded in the top and the water poured into the small room below (Photo by B. Castellón).

who left an ample record of his research on salt at the lagoon of Cuyutlán, on the Pacific coast of Colima (Reyes 1996, 2001, 2004a, 2004b, 2007, 2008). His focus included studies of a historical and anthropological character in this region, and in his more recent work he documented the moment of sudden technological change from the traditional saline soil filtration mechanisms to the current and very destructive use of plastic to accelerate crystallization and produce greater quantities of salt in less time. His work to rescue the ancestral methods is very valuable, as is his approach to each of the areas of the vast lagoon of Cuyutlán, near the sea, where conditions have been optimal for the production of high quality salt since ancient times. A great merit of his work is having documented, from various perspectives, the mechanism and main salt production unit known as 'tapextle', of which there exist different versions all along the Pacific coast. The former was a large horizontal filter made of wood, with the notable feature of a series of layered sewn palm leaves, pebbles, seashells, and clay which served to hold the saline soil previously selected and taken from the bed of the lagoon. The water was obtained from a nearby well, since the water table in the vicinity of the lagoon is high, and the resulting brine was collected in a receptacle below the filter made of low stone and lime walls. Finally the brine was taken out through small canals to evaporation basins where it crystallized into salt by solar evaporation (Figure 9).

The *tapextle* is a salt production unit sustained by a complex organization that lasted for several centuries; Reyes considered the possibility that its technique was derived from Asian influences in the sixteenth century, especially from the Philippines, which is a hypothesis yet to be explored. His studies opened up the possibility of creating a modern anthropology and history of salt in Mexico and represent an important reference for the richness of their information and the challenges offered to research on the history of technology.

A project inspired by the previous study of the lagoon of Cuyutlán was was that of Eduardo Williams in the neighbouring state of Michoacán, also on the Pacific coast (Williams 2002, 2008). The communities where this new research was undertaken still conserve many traditional elements that were documented by Williams in the best tradition of ethnographic rescue. Here the 'tapeixtle' is also used. The Michoacán system, however, retains traditional methods of evaporation

pond construction, including walls made from palm leaf to protect the saltwater from wind and detritus, among other traditional practices that can no longer be observed in Colima. Williams extrapolated from the ethnohistorical approach to make inferences regarding techniques used in more ancient times, underlining the archaeological evidence of the 'terreros' (distilled soil mounds), the eras or solar evaporation ponds, and the presence of ceramic vessels used mainly in the process of hauling water. Finally, his work is directed towards reflections about regional commerce networks and the exchange of salt.

Studies of inland solar evaporation salt works

During the decade of the 1990s, some anthropological and archaeological projects were restarted in the southwestern part of the center of Mexico, south of the city of Toluca, where there still exist solar evaporation salt works based on natural brines, which are obtained near the banks of the rivers that cross this mountainous zone. For this process, small containers made of stone slabs with walls made of clay and resin are constructed. These basins, where the previously concentrated brine is exposed to the sun, are called 'poches'. This is an ancient technique on the verge of disappearing that has been present in this region at least since the fourteenth century. The results of the first project in this area were published at the end of the twentieth century (Mata 1999) with a discussion of social, cultural and religious environments in relation to this activity. Later, an archaeological approach was initiated based on excavations made at the site of San Miguel Ixtapan (AD 750 – 800), a place that surely controlled a part of the salt industry in this area and where there is evidence of rituals related to water and salt (Osorio 2008). More recently a new, more detailed ethnographic and archaeological study of the technological processes of production at these saltworks was started and was used to hypothesize about their impact in pre-Hispanic times (De León Cortés 2012, 2015). This last study also records the details of traditional salt production and the local names for the artifacts used, and presents interesting reflections on innovations introduced in recent years, and the social pressures on the workers, implying a major change in the future of local saltworking (Figure 10).

As an extension of my own archaeological studies in the south of Puebla, in the region of Zapotitlán, I have been performing ethnographic and anthropological research at the saltworks in this area, and have also documented other inland salt production sites in the region of the Mixteca, between Puebla and the neighbouring state of Oaxaca (Figures 11, 12 and 13). In this case, my interest focuses on documenting those subtle technological details of traditional saltworking,

Figure 10. San Miguel Ixtapan, located in San Francisco, State of Mexico. Repair of poches or bowls where salt crystallizes, in May 2009 (Photo by B. Castellón).

in the face of persistent pressures in the gorges areas to obtain more salt in less time with the help of mechanical devices, which causes the loss of many ancient procedures. I have also become interested in the comparative study of different regional techniques, since it appears that within distances of 50 to 100km, salt workers act according to what they know of their neighbours, making adaptations, combinations, or even hybrid products from the various techniques used, the artefacts employed, such as ceramics, and brine filtration and concentration methods. In this way, documenting variants between saltworks that are geographically relatively close to each other can contribute to the reconstruction of a system of technological transformations that has adapted to the changing economic conditions of these regions throughout the centuries. This project includes technological changes and innovations from the pre-Hispanic age to the present and is currently ongoing (Castellón 2008b, 2008c, 2009a, 2009b). At the same time, in these same regions, ethnohistorical work and new archaeological observations have been made by researchers from Oaxaca, which help to complement our vision of these remote saltworks (Doesburg 2008, Doesburg and Spores 2015; León 2015a, 2015b).

Studies of solar evaporation salt works on the coast of the Pacific

Following the saltworking traditions further south on the Pacific coast in the State of Guerrero, anthropological studies have primarily concerned gender and exchange between the salt producers of the coastal regions and those in the interior mountainous zone since the late twentieth century. In these studies, aspects of social organization and the role of agents in the production of salt and associated activities are highlighted (Good 1995; Quiroz 2008). A problem that has recently become apparent and has been studied more closely is the social impact of migration to the United States among African descendants in the region of coastal Guerrero and how this affects the organization of salt production.

Figure 11. Zapotitlán Salinas, Puebla. Picking up the first salt in the center of the pond in November 2007. The baskets for drying the salt can be seen in the background (Photo by B. Castellón).

Figure 12. San Bartolo Salinas, Oaxaca. A salt worker moving the salt crystals for drying in November 2007 (Photo by B. Castellón).

Figure 13. Santa Maria Salinas, Oaxaca. A salt worker moving the water with branches to hasten the crystallization of salt in November 2007 (Photo by B. Castellón).

Climatic changes are another factor since they have affected the levels of the interior lagoons where salt is produced, and this has brought the introduction of motorized pumps and other modern elements that transform the traditional methods. Moreover, women have a very important role in the economy of this area and must now subsist solely on activities such as fishing, and especially employment outside the area to obtain money, since salt has become a high risk activity in the face of the changing conditions of the market and the environment.

Other, more recent research has begun on the coast of the Pacific and of this we can currently only give a general overview. First, we note an ethnographic and archaeological study at the Lagoon of Potosí, near the archaeological site of Xihuacan or Soledad de Maciel, an important political center of the Classic period that flourished around AD 450 and continued until late pre-Hispanic times, by the archaeologist Eric Saloma (Coordinación Nacional de Antropología 2013; Mateos-Vega 2013). The use of evaporation ponds is still a common practice in this zone.

Another ongoing study, is occurring in the north, in the area of Escuinapa, on the coast of Sinaloa, which is another zone of tidelands and coastal lagoons. This is an archaeological study of the activities there, including fishing with different techniques and the use of saltworking 'corrals,' which apparently have great antiquity (Grave 2014).

Finally, it is worth mentioning some brief publications related to the ancient importance of salt in Mexico including in particular a chapter on the evaporation saltworks of Chikinchel on the northern coast of the Yucatán Peninsula (Kepecs 2003). This author points out the importance of certain constructions that are present near the sea and of salt production by evaporation in wide spaces built for this purpose, although her archaeological evidence is not very clear, and she does not present data about the technological process. A similar situation is present at Xcambo, next to the city of Merida, where some ancient salt works co-exist with an archaeological site (Sierra 1999).

Examples of Industrial production

In the northwestern part of the country, on the peninsula of Baja California, the saltworks of Guerrero Negro are perhaps the world's largest open-sky industrial salt-producing complex (over seven million metric tonnes a year). More than 60 years after its creation (in 1954), this facility has been re-evaluated as a unique heritage resource for its landscape, climate, and geology (Gaitán and Cano 2009). Presently, arrangements are being made for its inclusion on the world heritage list by UNESCO and Mexican institutions.

Other regions of the country are the object of large-scale industrial exploitation by different methods, and there are marine exploitations (10), interior lagoons (2), and saline domes (2). Among the latter is the site of Tuzantépetl in Veracruz, on the Gulf Coast, where brine is produced in large quantities through subterranean injection of water into the saline dome located over two thousand meters below the surface of the earth. Then, the liquid is moved over 17km to the plant at Coatzacoalcos, where it is subjected to a refining process resulting in 1200 daily tonnes of pure salt. This salt is commercialized in Mexico but also in the markets of the United States, the Caribbean, and Central America (Secretaría de Economía 2014).

The salt industry in Mexico is a very extensive chapter that exceeds the limits of anthropological and archaeological study. For many years, the Mexican Association of the Salt Industry (AMISAC) has existed, performing activities, advising and supporting events related to salt and its industrial exploitation, and participating and promoting meetings and publications of an academic type (AMISAC 2016; Castellón 2008; Reyes 1998).

Final remarks

Studies about salt in Mexico have a long history, but they have not been continuous. Presently, salt studies are divergent in terms of their subjects and have been slowly increasing in number over the course of the past several years. However, it is still necessary to consolidate the work into a specific salt research tradition, particularly in the anthropology departments of various universities. Initial investigations moving in this direction have already been published (Figure 14) and serve as a reference for new researchers; it is now only necessary to organize more activities with this goal in mind and create more projects in the long term. Academic venues currently advancing this program are found only in the form of national and international meetings and through a few social networks. It is also necessary to point out that a good part of the studies on salt in Mexico are due to foreign institutions and researchers who work in Mexico, although this situation has become fairly balanced in the past few decades, during which eighteen projects were carried out in national study centers, versus ten foreign projects. We do not consider some low-diffusion notes.

Currently, the research is concentrated on coastal saltworks that are still active at a traditional or industrial level. There is less interest in the inland saltworks which, nevertheless, are numerous and

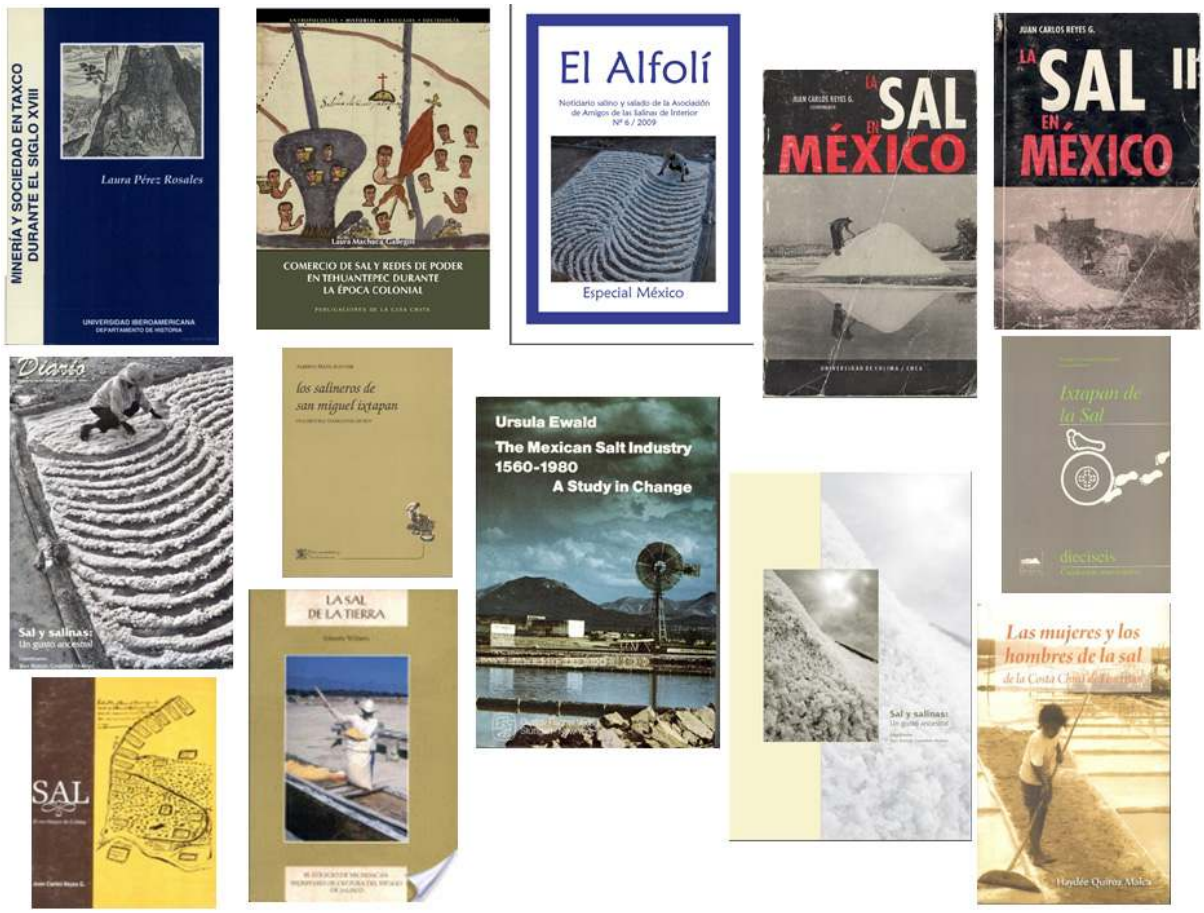

Figure 14. Front cover of some publications about salt in Mexico in the past twenty year

require more attention, since many are still in use, although this only occurs during certain years, and such attention often results in an ethnographic rediscovery. Other saltworks that are smaller but have already been recognised in previous centuries still await new researchers to come to them and begin the work of documentation. The recorded techniques are mostly those of solar evaporation, but as we have seen, there is a large vein of possible investigation concerning technological decisions that have been transformed with time and require ethnographic rescue. The documentation that focuses on current practices and contrasts them with historical data is also very common in many of the studies known so far. It is important to conduct greater academic exchanges, especially regarding documentation methodologies and on the possibilities of theoretical interpretation offered by salt studies. This will help to give shape to a legitimate trend of research on salt and its social, technological, ideological, historical significance. Without a doubt, the participation of new generations of historians, archaeologists and anthropologists in this work is also necessary, but at least at the beginning of the twenty- first century, this work appears to hold a promise of better times for saline studies in Mexico.

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References

Asociación Mexicana de la Industria Salinera. 2016. http://www.amisac.org.mx/

Anaya, E. 1995. La industria de la sal de tierra en el Valle de México: un método Prehispánico a punto de desaparecer In J.C. Reyes (ed.), *La Sal en México*: 223-248. Colima, Universidad de Colima, Dirección General de Culturas Populares.

Andrews, A. P. 1983. *Ancient Maya salt production and trade*, Tucson, University of Arizona Press.

Apenes, O. 1943. The 'Tlateles' of Lake Texcoco, *American Antiquity* 9, 1: 29-32.

Apenes, O. 1944. The primitive salt production of Lake Texcoco, Mexico, *Ethnos* 1: 35-40.

Baños, E. 1980. *La Industria salinera en Xocotitlán, Cuenca de México*. Tesis de Licenciatura, México, Escuela Nacional de Antropología e Historia.

Castellón, B. R. 2008a. Technologie et enjeux de la production du sel dans les salines préhispaniques de Zapotitlán, Puebla, Mexique In O. Weller, A. Dufraisse, and P. Pétrequin (eds.) *Sel, eau et fôret. D'hier à aujourd'hui*: 119-142. Le Cahieres de la MSHE Ledoux 12, Homme et environnement, Besançon, Presses Universitaires de Frenche-Comte.

Castellón, B. R. 2008b. Arqueología, etnografía, decisiones técnicas y complejidad social: la producción de sal antigua en el centro de México In F. López, W. Wiesheu and P. Fournier (eds.) *Perspectivas de la investigación arqueológica III*: 171-200. México Escuela Nacional de Antropología e Historia.

Castellón, B. R. 2008c. Entre cactus y barrancas: constructores de terrazas y productores de sal en el sur de Puebla'. In B. Castellón (eds.), *Diario de campo* Suplemento 51, *Sal y salinas: Un gusto ancestral*: 105-111, México, Instituto Nacional de Antropología e Historia.

Castellón, B. R. 2009a. Un grano de sal: aportaciones etnoarqueológicas al estudio histórico de una industria ancestral', *Anuario de Historia 2007* 1: 67-83.

Castellón, B. R. 2009b. Elementos tecnológicos indígenas y europeos en la producción de sal en Puebla y Oaxaca', *El Alfolí* 6: 4-9, Guadalajara, España, Asociación de Amigos de las Salinas de Interior.

Castellón, B. R. 2016. *Cuando la sal era una joya: antropología, arqueología y tecnología de la sal durante el Postclásico en Zapotitlán Salinas, Puebla*, México, Instituto Nacional de Antropología e Historia.

Castellon, B. R., Alexianu, M., Curcă, R. and Cotiugă, V. 2009. *Salt production by lixiviaton, Nexquipayaq*, Mexico.

Ceja Tenorio, J. F. 1998. Iztahuehue, la salina vieja de Los Tuxtlas, Veracruz. In J.C. Reyes (ed.) *La sal en México II*: 43-64. Colima, Gobierno del Estado de Colima, Universidad de Colima, Consejo Nacional para la Cultura y las Artes.

Ceja, J. A. 2007. *Estrategias de obtención de sal en la región de Soconusco, Acayucan, Veracruz. Un modelo etnoarqueológico de obtención de sal en grupos contemporáneos no industrializados*, Tesis de Maestría, México, Escuela Nacional de Antropología e Historia.

Ceja, J. A. 2008. La simbolización del espacio en la obtención de sal en Soconusco, Acayucan, Veracruz. In B. Castellón (ed.) *Diario de Campo* Suplemento 51, *Sal y Salinas: Un gusto ancestral*: 117-127. México, Instituto Nacional de Antropología e Historia.

Ceja, J. A. 2011. El Salado-Ixtahuehue and Benito Juárez-Soconusco: an ethno-archaeological study of salt pre-industries of southeast Veracruz, Mexico. In M. Alexianu, R. Curcă and V. Cotiugă (Eds.), *Archaeology and anthropology of salt: a diachronic approach*: 37-48. Proceedings of the International Colloquium, 1-5 October 2008 'Alexandru Ioan Cuza' University, British Archaeological Reports International Series 2198. Oxford.

Ceja, J. A. 2016. *Identidad tecnológica en una salinera arqueológica del sureste veracruzano: un análisis comparativo con algunas salineras preindustriales en el mundo.* Unpublished PhD thesis Universidad Nacional Autónoma de México.

Charlton, T. H. 1969. Texcoco fabric-marked pottery, tlateles, and salt-making. *American Antiquity* 34, 1: 73-76.

Charlton, T. H. 1971. Texcoco fabric-marked pottery and salt-making: a further note. *American Antiquity* 36, 2: 217-218.

Coordinación Nacional de Antropología Instituto Nacional de Antropología e Historia. 2013. La producción de sal en Petatlán Guerrero https://www.youtube.com/watch?v=Eccz_NJwuqo.

Danielewski, A. 1993. Die salzstraßen des Aztekischen staates: vernetsung von handel und tribut, *Ethnographisch-Archäologische Zeitschrift . Z* 34: 69-87.

De León Cortés, M. 2013. *Producción de sal en San Miguel Ixtapan.* Época *Prehispánica*, Tesis de Licenciatura en Arqueología, Tenancingo, Universidad Autónoma del Estado de México.

De León Cortés, M. 2015. Producción de sal en *poches* en el Paraje San Francisco de San Miguel Ixtapan, Estado de México, *El Alfolí* 16: 3-12.

De León, J.P. 2009. Rethinking the organization of Aztec salt production: A domestic perspective. In K. Hirth (Ed.) *Housework: craft production and domestic economy in ancient Mesoamerica*: 45-57. Malden, Archaeological Papers of the American Anthropological Association.

Doesburg, S. 2008. Documentos pictográficos de la Mixteca Baja de Oaxaca: el Lienzo de San Vicente El Palmar, El Mapa 36, y el Lienzo Mixteca III, *Desacatos* 27: 95-122.

Doesburg, S. and Spores, R. 2015. Salt production and trade in the Mixteca Baja: The case of the Tonalá-Atoyac-Ihualtepec salt works. In D., Zvorober and P. C. Kroefges (eds.), *Bridging the gaps: integrating archaeology and history in Oaxaca*: 231-262. México Boulder, University Press of Colorado.

Ewald, U. 1985. *The Mexican salt industry 1560-1980: A study in change*, New York-Stuttgart, Gustav Fischer Verlag.

Gaitán, J. and Cano J. 2009. Las salinas de Guerrero Negro, Baja California Sur: un elemento del patrimonio geológico como factor de desarrollo territorial. *El Alfolí* 6: 19-29.

Gamboa, L. M. 2007. Proyecto de salvamento arqueológico circuito exterior mexiquense, http://www.ilustrados.com/tema/5641/Proyecto-salvamento-arqueologico-circuito-exterior-Mexiquense.html

García, A. 1997. La industria de la sal y de la cerámica en la región de Coxcatlán, Tehuacán, vista por las

fuentes etnnohistóricas y arqueológicas. Siglos XII al XVI. In E. de la Lama (ed.), *Simposio Internacional Tehuacán y su Entorno: Balance y Perspectivas*: 69-77. México, Instituto Nacional de Antropología e Historia.

Good, C. 1995. Salt production and commerce in Guerrero, Mexico. An ethnographic contribution to historical reconstruction, *Ancient Mesoamerica* 6: 1-13.

Grave, A. 2014. Las salinas de Escuinapa: una larga historia. Nuevas evidencias arqueológicas, paper presented in the *XXX Mesa Redonda de la Sociedad Mexicana de Antropología*, Querétaro, Sociedad Mexicana de Antropología.

Hamilakis, J. and Anagnostopoulos, A. 2009. ¿What is archaeological ethnography? *Public Archaeology: Archaeological Ethnographies* 8, 2-3: 65-87.

Kepecs, S. 2003. Chikinchel. In M. E. Smith and F. F. Berdan (eds.), *The Postclassic Mesoamerican world*: 259-268, Salt Lake City, The University of Utah Press.

León, R. 2015a. La extracción de sal en la Mixteca Alta, *La Gaceta del Instituto de Patrimonio Cultural del Estado de Oaxaca* 29: 24-32.

León, R. 2015b. La tecnología para la producción de sal en la Mixteca Alta, *Gremium* 3: 28-32.

Lind, M. and Urcid, J. 2010. *The lords of Lambityeco. Political evolution in the Valley of Oaxaca during the Xoo phase*, Boulder, University Press of Colorado.

Liot, C. 1995. Evidencias arqueológicas de producción de sal en la Cuenca de Sayula (Jalisco): Relación con el medio físico, estudio de tecnología. In J.C. Reyes (ed.), *La sal en México*: 3-32 , Colima, Universidad de Colima, Dirección General de Culturas Populares.

Liot, C. 2000. *Les salines préhispaniques du Bassin de Sayula (Occident du Mexique). Milieu et tecniques,* Oxford, British Archaeological Reports International Series 849.

Liot, C. 2002. 'Briquetage' et production de sels par lessivage de terres salées au Mexique. In O. Weller (ed.) *Archaeologie du sel. Techniques et sociétés dans la Pre- et Protohistoire européene* : 81-98. Rahden/Westf, Verlag Marie Leidorf.

Machuca, L. 2007. *Comercio de sal y redes de poder en Tehuantepec durante la* época *colonial*, México, Centro de Investigaciones y Estudios Superiores de Antropología Social.

Mata, A. 1999. *Los salineros de San Miguel Ixtapan: Una historia tradicional de hoy*, Toluca, Instituto Mexiquense de Cultura.

Mateos-Vega, M. 2013. http://www.jornada.unam.mx/2013/02/11/cultura/a08n1cul

Mayer-Oaks, W. 1959. A stratigraphic excavation at El Risco, Mexico, Philadelphia, *Proceedings of the American Philosophical Society* 103, 3: 332-372.

McKillop, H. 2002. *Salt. White gold of the ancient Maya*. Gainesville, University Press of Florida.

McVicker, D. E. 1974. Variation in protohistoric Maya settlement Pattern, *American Antiquity* 39, 4: 546-556.

Mendizábal, M. O. 1928. *La influencia de la sal en la distribución geográfica de los grupos indígenas de México*, México, Imprenta del Museo Nacional de Arqueología, Historia y Etnografía.

Mendizábal, M. O. 1946a. La distribución geográfica de la sal, *México Prehispánico*: 742-753.

Mendizábal, M. O. 1946b. *Obras Completas* 2: 175-340. México

Millhauser, J. K. 2012. *Saltmaking, craft, and community at Late Postclassic and Early Colonial San Bartolome Salinas*. Unpublished PhD thesis, Evanston, Illinois, Department of Anthropology, Northwestern University.

Minc, L. 1999. The Aztec salt trade: insights from the INAA of Texcoco fabric-marked pottery, Chicago, Paper presented in the *64th Annual Meeting of the Society for American Archaeology*.

Noguera, E. 1943. Excavaciones en El Tepalcate, Chimalhuacán, México, *American Antiquity* 9, 1: 33-43.

Noguera, E. 1975. Identificación de una saladera, *Anales de Antropología* 12: 117-151. México, Universidad Nacional Autónoma de México.

Nunley, P. 1967. A hypothesis concerning the relationship between Texcoco fabric-marked pottery, tlateles, and chinampa agriculture. *American Antiquity* 32, 4: 515-522.

Osorio, V. 2000. La sal en la época prehispánica. In R. Hernández (ed.), *Ixtapan de la Sal*: 11-30. Zinacantepec, Edo. México, Cuadernos municipales 16, El Colegio Mexiquense.

Osorio, V. 2008. El recinto de las esculturas y su posible vínculo con el ritual salinero. In B. Castellón (ed.), *Diario de Campo* Suplemento 51, *Sal y Salinas: Un gusto ancestral*: 48-51, Noviembre-Diciembre, México, Instituto Nacional de Antropología e Historia.

Parsons, J. R. 1989. Una etnografía arqueológica de la producción tradicional de sal en Nexquipayac, Estado de México. *Arqueología* (2da *Época* Julio-Diciembre): 69-80. México, Instituto Nacional de Antropología e Historia.

Parsons, J. R. 1994. Late Postclassic salt production and consumption in the Basin of Mexico: Some insights from Nexquipayac. In M. Hodge and M. Smith (eds.), *Economies and polities in the Aztec realm, studies on culture and society*: 257-290. New York, Institute for Mesoamerican Studies, University at Albany, State University of New York Institute for Mesoamerican Studies.

Parsons, J. R. 1996. Tequesquite and ahuauhtle: rethinking the prehispanic productivity of Lake Texcoco-Xaltocan-Zumpango. In A. G. Mastache, J. R. Parsons, R. S. Santley and M. C. Serra (eds.) *Arqueología Mesoamericana: Homenaje a William T.*

Sanders: 439-459. México Instituto Nacional de Antropología e Historia/Arqueología Mexicana.

Parsons, J. R. 2001. *The sast saltmakers of Nexquipayac, Mexico. An Archaeological ethnography*. Anthropological Papers, Museum of Anthropology, Ann Arbor, University of Michigan.

Parsons, J. R. 2006. *The last pescadores of Chimalhuacán, Mexico: An Archaeological ethnography*. Museum of Anthropology, Ann Arbor, University of Michigan.

Parsons, J. R. 2008. Los últimos salineros de Nexquipayac, Estado de México: El encuentro de un arqueólogo con los vínculos vivos de un pasado prehispánico. In B. Castellón (ed.), *Diario de Campo* Suplemento 51, *Sal y Salinas: Un gusto ancestral*: 69-79. México, Instituto Nacional de Antropología e Historia.

Parsons, J. R. 2010. The pastoral niche in Prehispanic Mesoamerica. In J. E. Staller and M. D. Carrasco (eds.) *Pre-Columbian foodways: interdisciplinary approaches to food, culture, and markets in ancient Mesoamerica:* 109-113. New York, Springer.

Peterson, D. A. 1976. *Ancient commerce*. Unpublished PhD thesis, New York, State University of New York.

Quijada, C. 1984. El *Salitre una salina prehispánica en Tonatico, Estado de México*, Tesis de licenciatura en Arqueología, México, Escuela Nacional de Antropología e Historia.

Quiroz, H. 2008. *Las mujeres y los hombres de la sal de la Costa Chica de Guerrero*, México, Consejo Nacional para la Cultura y las Artes.

Reyes, J. C. 1995. (ed.) *La sal en México*, Colima, Universidad de Colima, Dirección General de Culturas Populares.

Reyes, J. C. 1996. El pozo de tapextle de Colima, México. Breve historia de un ingenio tecnológico para la producción de sal, *Journal of Salt History*, 4: 117-135.

Reyes, J. C. (ed.) 1998. *La sal en México II*, Colima, Gobierno del Estado de Colima, Universidad de Colima, Consejo Nacional para la Cultura y las Artes.

Reyes, J. C. 2001. Este es el arte y modo de hacer sal. Tecnología salinera novohispana en las relaciones geográficas del siglo XVI. In C. Litchfield, R. Palme and M. Piasesecki (eds.), *Le monde du sel. Melanges offerts à Jean-Claude Hocquet, Journal of Salt-History* 8/9: 219-244. Innsbruck, Berenkamp.

Reyes, J. C. 2004a. El tapextle salinero: notas sobre su origen, distribución y variantes. In E. Williams (ed.) *Bienes estratégicos del antiguo Occidente de México. Producción e intercambio*: 183-206. Zamora, El Colegio de Michoacán.

Reyes, J. C. 2004b. *Sal. El oro blanco de Colima. La industria salinera colimense durante el virreinato*, Colima, Gobierno del Estado de Colima, Secretaría de Cultura.

Reyes, J. C. 2007. La innovación tecnológica y el fin de una era. El caso de Colima, México. In M. N. Morére (ed.) *Las salinas y la sal de interior en la historia: economía, medio ambiente y sociedad* 2: 857-876. Madrid, Universidad Rey Juan Carlos.

Reyes, J. C. 2008. Los estudios de la sal. In B. Castellón (ed.), *Diario de campo* Suplemento No. 51, *Sal y salinas: Un gusto ancestral:* 13-17. México, Instituto Nacional de Antropología e Historia.

Rinaldini, L. 2016. http://www.luca-rinaldini.com/wp/project/sale/

Robertson, I. G. and Gorenflo, L. J. 2007. *A seminar: assessing current understanding and charting future research in Basin of México Archaeology*: Conference held at San Miguel Ometusco, Foundation for the Advancement of Mesoamerican Studies, September 2-7.

Ruiz, D. 2008. *Nonoalco-Tlatelolco: productor de sal en el Posclásico Temprano*. Tesis, México, Escuela Nacional de Antropología e Historia.

Sánchez, M. 1984. *Zacatenco: una unidad productiva de sal en la ribera noroccidental del Lago de Texcoco*. Tesis, México, Escuela Nacional de Antropología e Historia.

Santley, R. S. 2004. Prehistoric salt production at El Salado, Veracruz, México. *Latin American Antiquity* 15, 2: 199-221.

Secretaría de Economía. 2014. *Perfil del Mercado de la Sal*, México, Dirección General de Desarrollo Minero.

Séjourné, L. 1970. *Arqueología del Valle de México. Culhuacan*. México, Instituto Nacional de Antropología e Historia.

Séjourné, L. 1983. *Arqueología del Valle de México. De Xochimilco a Amecameca.* México, Siglo XXI.

Stoner, W. D., Millhauser, J. K., Alegria, E. R., Overholtzer, L. and Glascock, M. D. 2014. Taken with a grain of salt: experimentation and chemistry of archaeological ceramics from Xaltocan, Mexico. *Journal of Archaelogical Method and Theory* 21: 862-898.

Talavera, E. 1979. *Las salinas de la cuenca de México y la cerámica de impresión textil*. Tesis, México, Escuela Nacional de Antropología e Historia.

Tolstoy, P. 1958. *Surface survey of the northern Valley of Mexico: The Classic and Postclassic periods*. Philadelphia, American Philosophical Society.

Vázquez, D. 2008a. Testimonios salinos en el semidesierto potosino. El archivo histórico de Salinas del Peñón Blanco, del siglo XVIII al XX. In B. Castellón, *Diario de Campo* 51, *Sal y Salinas: Un gusto ancestral*: 81-91. México, Instituto Nacional de Antropología e Historia.

Vázquez, D. 2008b. *Guía del Archivo Histórico de Salinas del Peñón Blanco, 1713-1945*. El Colegio de San Luis Potosí.

Vázquez, D. 2008c. *Rastros de sal*, México, Fondo Estatal para la Cultura y las Artes de San Luis Potosí, Conaculta.

Vogt, E. Z. 1969. *Zinacantan: A Maya community in the highlands of Chiapas*, Cambridge. Harvard University Press.

Williams, E. 1999. The Ethnoarchaeology of salt Production at Lake Cuitzeo, Michoacan, Mexico. *Latin American Antiquity* 10, 4: 400-410.

Williams, E. 2002. Salt production in the coastal area of Michoacan, Mexico: An ethnoarchaeological study, *Ancient Mesoamerica* 13, 2: 237-253.

Williams, E. 2003. *La sal de la tierra: Etnoarqueología de la producción salinera en el Occidente de México,* Zamora, Guadalajara. El Colegio de Michoacán. Secretaría de Cultura del Estado de Jalisco.

Williams, E. 2008. Producción y comercio de la sal en Michoacán antiguo. In B. Castellón (ed.) *Diario de Campo* 51, *Sal y Salinas: Un gusto ancestral*: 41-49. México, Instituto Nacional de Antropología e Historia.

Williams, E. 2014. *La gente del agua: etnoarqueología del modo de vida lacustre en Michoacán*. Zamora, El Colegio de Michoacán.

Huixtocíhuatl. Goddess of Salt

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Abstract

In this paper, I aim to present the main traits of the Goddess of Salt, in an attempt to reveal the importance this mineral had for the lives of the indigenous people, during the final years of the Mesoamerican splendour (before the arrival of the Spanish). The present paper focuses on an ethnohistorical perspective. Religion was closely interwoven with the power relations of the ruling circles and was created by incorporating deities pertaining to previous periods, gods whose powers over nature´s forces were already acknowledged and others whose characteristics were clearly oriented towards the military aspects and human sacrifice. Thus joined, military and religion were subject to political approval, contributing to create a stronger State. The objective of this paper is to pinpoint the importance salt had in the life and rituals of the Mexica people—to the point where they created a goddess named Huixtocíhuatl—whom the salt mine workers worshipped in order to ensure she provided them with this basic necessity. The goddess was also worshipped by traders or the Pochteca population, who prayed to have successful journeys, hoping that salt reached the regional markets. A specific date was set for the celebration of this goddess. Festivities included rituals and human sacrifices in which all the dwellers of México, Tenochtitlán took part. The timeframe is set during the Postclassical period (900 A.D to 1521 A.D), in the Valley of México.

Keywords: Salt Goddess, religion, salt history, Mexico.

Introduction

In this document I expose the characteristics of the goddess of salt to outline the importance of this mineral in the ritual and religious life of the indigenous people during the final period of Mesoamerican splendour, previous to the arrival of the Spanish. The work is of an ethnohistorical character, as such I am circumscribed to the sources which narrate facts relative to the prehispanic period, although it bears pointing out that most of them were crafted during the early colonial period, to various ends, and as such they already reflect the sieve of western thought.[1] The recovered data is reinforced through the contemporary works which deal with the topic of salt.

The objective of this work is therefore to show the importance of salt in the ritual life of the *Mexica*, such that it generated the creation of the goddess of salt, fertility, and saltwater, denominated *Huixtocíhuatl,*[2] lady of *Huixtotlan*, patron of those who work and sell the salt, revered both by the *Iztlateros* or saltmakers —with the end of securing that food in the life of the prehispanic peoples of Mexico— and by the merchants or *pochtecas* —to achieve success in their travels and place the salt in all the regional markets—. For her cult, specific dates and rituals were established wherein the domiciles of Mexico *Tenochtitlán* participated. The period this document deals with is the late Post-classic, between 1321 and 1521 CE. The scenario is circumscribed to the Basin of Mexico.

We shall approach the Mexica, an ethnic group which arrived to the Basin of Mexico after a long migration which mythically had its start in *Aztlán*[3] and after traversing extensive territories and enduring many vicissitudes, managed to settle in the site which had been prepared for them, according to predictions of their god *Huitzilopochtli*. They were searching for an islet, whereupon there would be a prickly pear cactus, and above it there had to be an eagle devouring a snake, and they found it in the Lagoon of Mexico. The settlement was built in the centre of an area where a large amount of cities with a high level of development had existed since earlier times.[4]

This ethnic group picks up the knowledge generated by their predecessors, to which they add their own military knowledge above all, and with that baggage founds a powerful state, mostly cultivated upon military power,

[1] In an earlier work I recount the archaeological works which have been conducted regarding the topic of salt and link them to a given area of the Basin of Mexico, the same which I now discuss in this document. Monzón 1991.

[2] In the documents here mentioned, the name of this goddess is written in the following ways: Huixtocíhuatl, Huijtocihuatl, Huijotcihuatl, Vixtocioatl, Uixtocíhuatl, Iztociguatl.

[3] *Aztlán* is not yet located in current geography, which results in it being confused between a mythical or a real place. Those who dwelt there were called Aztecs, and upon migrating retook their own identity as *Mexitin* or *Mexica*, related to the god *Mexi* or *Huitzilopochtli*, god and guide of the pilgrimage (López Austin and López Luján 1996: 191-192).

[4] Among which are Texcoco, Chalco, Xochimilco, Culhuacán, Azcapotzalco, Tlacopan, Cuauhtitlán, Tzompanco, Xaltocan, Tenayuca, Tepeyacac, Iztapalapa, Mexicaltzinco, Tlalnepantla, Huexotla, y Coatinchan (Boehm de Lameiras 1986: 24).

with a highly bureaucratized and hierarchic society at the top of which there was a powerful governing elite. The authorities fought for expansion and territorial control, the dominion of the peoples, through a complex economic system, controlled by military and merchants at the service of the State (Boehm de Lameiras 1986: 24).

Although some previous knowledge and cultural traditions were revisited and spread, militarism was established as preponderant, which derived into political instability, territorial expansion through conquest, and consequently the imposition of tribute and manpower. Pluriethnic and militaristic regional units were formed.

The protagonists of this moment where the Mexica who supported their power in strongly organized groups of warriors, which included the eagle warriors and the tiger warriors. Political power was based on the familiar heredity which controlled all aspects of society. There were ample commercial networks which distributed the merchandise throughout the entire Mexican territory, directed by a group of merchants who not only moved the merchandise but also the people, the ideas, the knowledge, while acting as spies at the same time. They highlighted the military art, urbanism, monumental architecture, and the development of metallurgy.

Relevant political connections were established, as is the case with the Triple Alliance (1427/1428 CE), which secured the power of a few families and a determined region, there were highly differentiated social estates, demographic movements which opened the way to new territories and new cultural contacts, matrimonial alliances which consolidated the groups in power, new techniques in agriculture —such as the chinampas—, a high specialization in work, education in temple-schools, calendars, reading of the stars from the cusps of pyramids and on the hills, herbal medicine, writing in books now known as codices wherein they bequeathed us their knowledge about history, geography, genealogy, myths, magic, divination and religion (López Austin and López Luján 1996: 175-271). Thus, linking militia and religion, before the direction of the political scope, the State was notably strengthened.

Salt[5]

It was so important in prehispanic Mexico, that it influenced the development of the groups who benefited from and controlled the salines, which carried a condition of wealth, and important element of exchange, and a measure of social status. It was therefore considered a part of the peoples' political and military development; for their part, the monopolies generated from the acquisition of this mineral made the economic development of local political entities possible, although their general production and commerce was supervised by the State. Despite the former, the exploitation of the salt works had its ups and downs, since Castellón (2015:79) recounts the belief they had regarding the salt works as being 'dirty and saltpetrous places where stenches and bad vapours were abundant', as well as the essence of the deities. It was possible that whoever frequented them could be infected or fall ill, as well as the possibility of facing supernatural elements, which is why it is suggested they were made out to be extremely dangerous and sinful. The female beings which roamed there could harm the men.

By their distribution, it seems that every ecological niche where lay the possibility of obtaining salt was exploited.[6] The settlements where the work was done, according to Castellón (2008:106), showed a great deal of mounds or 'terreros', as silent witnesses of the residue that remained of the washed earth after obtaining a concentrated brine, as well as small deposits of stone and stucco used for filtration. There are also lesser buildings with stoves to which fragments of ceramic molds used to form the salt blocks were attached.

Concretely, the Basin of Mexico had a series of interconnected lakes fed by currents which descended from the mountains and channelled into a series of rivers.[7] At the shores of these lakes a large amount of peoples were settled, many of which exploited the salt to the point where a salt industry was established; among these we can mention *Mexicaltzingo, Coyoacán, Mixcoac, Huitzilopochco, Guadalupe, Ixtapalapa, Ecatepec, Cuitláhuac, Mixquic and Cuautitlán*. For their exploitation, they waited until the drought season concentrated the salts following the fluctuations in the water levels, as it went up during the rain season and during droughts a large amount of brine was deposited on the shoreline, which they gathered, washed, and finally applied fire until they obtained crusts of residual salts.

For the purpose of separating water from salt and to recover it for their consumption and distribution, they applied work processes and techniques, every one of which had specificities according to the region from

[5] This section is furnished by the works of Castellón 2008, 2015; Ciudad Real 1976; Mendizábal 1946, 1946 a; Díaz del Castillo 1976; Gibson 1967; Hassig 1985; Monzón 1991; Motolinia 1979; Muñoz Camargo 1972; Navarrete 2008; Sahagún 1975; Torquemada 1983; and Williams 2008.

[6] Such as springs, tidelands, deposits of gem salt, saltwaters —lacustrine and maritime—, saltpetre or saltlands(?), tequesquiteras, salt lakes, lagoons, rivers, springs, salt currents, saline efflorescences; sources of live salt.

[7] Zumpango, Xaltocan, Texcoco, Xochimilco and Chalco fed by rivers such as the Mixcoac, Coyoacán, Guadalupe, Tlalnepantla, Azcapotzalco, Cuauhtitlán, Cuacalco, Tepotzotlán, Teotihuacán, Papalotla and Coatepec (Hassic 1985: 53-54).

Figure 1. System of lakes surrounding ancient México Tenochtitlán. Postclassic. Basin of México (Taken from www.mexicomaxico.org author: Tomás Filsinger, 2009).

which it was recovered and the methods used, such as solar evaporation and evaporation through fire, both successfully practised during the Pre-hispanic age; in some cases they also utilised appropriate constructions and equipment.

Salt had diverse qualities determined by the place of collection and the process to which the brine was exposed. There were salt works recognised for their high quality, for which purification was not necessary. According to its characteristics, salt could be fine, coarse, thick, very white, without the aftertaste of sand, with the aftertaste of lime, which took away from the flavour, and with more or less flavour. We even know about its qualities according to the region, such that *Texcoco* provided an inferior quality saltpetre and the soil between *Teotihuacán* and *Otumba* yielded high quality salt.

Not all the peoples had this resource within their jurisdiction, and for their supply a commercial network was built around the distribution of this mineral. The natural routes marked by the shore of the Pacific were the ones which the first salt merchants followed, however the raids on expeditions made some of them change towards the highlands, to the protection of the mountains. In this way, the salt works led to the development of routes and a concurrence of roads which went on to be important to the indigenous economy.

They didn't always get the salt, as it seems that they waylaid and raided the roads in order to get it, which sometimes caused armed conflicts, since it was considered a strategic resource, a product of the first necessity, and its consumption was in great quantities, being a part of the basic foods of the indigenous diet.

In addition to everyday consumption, it was used to cure abscesses, clean teeth, salt meat and tan hides.

The merchants or *pochtecas,* whose antecedents reach back to the Mesoamerican Preclassic, refined their practises with the passage of time. In the Post-Classic, they were already grouped together in guilds which controlled the commercial routes and travelled long distances, which allowed them to unite the populaces but also to dominate them, since they knew about their resources, weaknesses and strengths. This tactic allowed them to impose themselves in wide territorial expanses, apply the tributary rates, and in cases of resistance obtain prisoners destined to be human sacrifices. The poor *pochtecas* exchanged salt for raw materials in the smaller markets or by going door to door. When the merchants began their journeys they made a fast of salt and peppers which lasted for the entire trip.

For their own part, the *Paynanis,*[8] considered mailmen and merchants at once, in their search of routes opened the way to warriors. They traded both basic foodstuffs and sumptuous merchandise destined to the priestly class or the elite, but they were also intermediaries of some products, as was the case of salt, since their first incursions were around the surrounding lakes, where the salt workers were already exploiting the salt.

Salt was important as an exchange currency at the *tianguiz*[9] or regional markets, which generally took place every five days. There, salt was offered in different qualities, although the very fine, clean and good one was always destined for the market of Mexico. It was sold in the form of round or elongated loaves, some of them dry and sandy, others the colour of brick. At the ports, the ships were provided with salt, which they then distributed at the coasts of the Gulf of Mexico, the Pánuco, Havana and Honduras.

The groups in power made the use and consumption of salt a political and military instrument. Sources narrate that there were peoples with no salt works within their territories, and in order to keep their independence they preferred to be deprived of it, since the Mexica were in control of all the commercial routes; the roads were closed to their enemies and the product kept from reaching them (it is said that for this reason the Tlaxcalans didn't eat salt for 70-80 years). There were fights over the permanent possession of the salt works, and upon getting them they obtained at the same time economic and political independence, although they could also be the cause of inter-ethnic conflicts. Salt was used as part of the tribute to the principal lords, as there are reports that in the court of *Moctezuma —tlatoani*[10] of *Tenochtitlán*— sixteen hundred salt loaves were consumed yearly, with which the *macehual* salt dealers had to supply him. It is also mentioned that in the palaces of *Netzahualcóyotl —tlatoani* of *Texcoco*— sixteen hundred salt loaves the size of a Castilian one were consumed (Torquemada 1983, Vol. I: 213). Salt was likewise looked to as a part of the gifts exchanged among tlatoanis to settle differences and/or to avoid military confrontations.

Finally, it is necessary to speak of the myths surrounding this mineral from the prehispanic age, some of which have persisted up to our time, with nuances which time and cultural contacts have caused, especially in indigenous communities. Castellón (2015: 56-60) has compiled a great deal of them, ethnographically as well as from documentary sources, in various regions of the country. From his work he concludes that the origin of salt was related to the sea and fish, but also to sins and transgressions which took place in the age of the gods, before human existence. He finds a common theme: salt is a hot and feminine mineral resulting from excretions emanated from the body of the gods, after battles which took place between them. Salt comes from the unchaste parts of the gods and its always negative presence is related to the transgression of normativity and sins of a sexual nature. For these reasons, salt and its use are considered dangerous and may carry grave consequences for humans, such that it was subject to rigorous rules and restrictions. Likewise it is believed that salt should not be eaten near the bodies of water where the helpers of *Tláloc* (the rain god) reside.

Religion in Post-Classical Mesoamerica

Religion —strongly allied to the groups in power— was constituted by integrating gods from previous times, already recognised for their powers to control nature, with others whose characteristics show a clear tendency to the military and human sacrifice (in such a way that military conquests provided prisoners for such ends). The former is reaffirmed in the facts contained in the Codex Telleranio-Remensis (Codex Telleranio-Remensis 1995: 133) where it is written that the Mexica would not have conceived their deities, their patrons, the calendar, nor their ancestral divisions, but adopted them from older structures.

Religion held a fundamental role at all times and intervened in all aspects of society, since it influenced commerce, politics, conquests and all events that individuals went through from their birth until their death. The political order was considered a military theocracy, and the purpose of war was subordinated to the religious aspect. From its origins, the creation of the gods was based on the masculine/feminine duality, and as such they believed they had been created by the primordial couple: *Ometecuhtli* and *Omecíhuatl,*[11] who spawned four sons, and from them the entire pantheon of gods is derived. They had so many gods that it has been classified as polytheistic, supported by an extensive and complex pantheon of goddesses and gods with specific iconographic attributions and attributes, some incorporated from previous times and others adopted from the conquered peoples. It is very probable that it had its antecedents in the Classic period, when the elites consolidated their political position; ideological control was cemented in the region and the priesthood was part of power, explaining why the religious institutions were included within the

[8] Náhuatl word which means 'the mailman, he of the light feet, the runner, the postal merchant'. Their protecting God was *Paynal.*

[9] Word originating from the Náhuatl *tianquiztli* which is translated as market.

[10] It is possible to translate this word from Náhuatl as governor or 'one who governs'.

[11] León-Portilla thinks they are indispensable opposites, where man generates and woman conceives in a duality of a sexual character. Cited by Alcina Franch 1992: 270.

circles of government (Caso 1946: 343-346; Caso 1976: 117; Lockhart 1999: 291, 341; López Austin 2002: 58).

According to Kirchhoff (Kirchhoff 2002: 443) the gods of the Classic period were deities of gestation and fertility, and with those of rain and water, were partly feminine and partly masculine. It was a society where every event was determined by the gods and for this reason could only be governed by them, so that the activities of priestesses and priests were only as personifiers of the gods.

Against this background, the priests of the Post-Classic established a vast and rich pantheon of gods, whom they situated at precise dates. Based on the calendars under which they held their ritual rule, they were given an origin, a hierarchy, advocacies, specific rituals, material representations, a proper attire, their kinship with other gods, and the natural phenomena they personified. As such, new forms of worship with military and political overtones are presented, with an increase in human sacrifice and cultural manifestations related to death (López Austin and López Luján 1996: 175-271).

According to Báez-Jorge (Báez-Jorge 1988: 91-93) it was a system that fulfilled the self-comprehensive demands of the individual, groups and communities, while it also justified the actions of economic and political subjugation and allowed for the acquisition of tributes for celebrations and victims destined for human sacrifice, a nodal aspect of this religion.

López Austin (López Austin 1994: 175-176; 2002: 19-85) considers this as a single religion which he divides into two stages: the formative, where the hard nucleus is integrated, and the developmental, which is subdivided into three periods: the symbolic consolidation, the systematization of knowledge, and the splendour. They show a constant preoccupation for communication and coexistence between the world of man, the home of the gods, and supernatural entities. He considers it difficult to classify the gods, since the various pantheons are conformed by divinities that either meld among themselves or are separated into divine components, which gives rise to other advocacies of that same divinity; in the same way the gods' attributes and nature can radically change as they perform various functions. The author integrates the earth and water gods in the following way: 1. *Tláloc* or *Tlalocantecuhtli*. 2. Mother Goddesses. 3. Auxiliaries of *Tláloc*. 4. Auxiliaries of the mother goddesses. 5. The ancestors. 6. Other gods such as that of Death, that of Wind and that of Corn.

Sahagún (Sahagún 1975: 53) contends that they held as gods those who ruled the universe, fire, the spirits, air, the stars, water, the sun and the moon. The Mexica believed that the power of the world was in the hands of the gods and that there was a succession of rule, at that time in the hands of their god *Huitzilopochtli*. This author classifies 39 gods and organises them into 13 triads, taking into consideration the similarities and/or kinship among them, since he supposes that they lived intermingled with the peoples and had their place and purpose within the union of populaces and gods.

Kirchhoff (Kirchhoff 2002: 392-421-422) thinks that this order predates the Mexica and proposes a division into two large groups: the basic deities of nature and the ruling gods of the various regions. The former (agriculture-fertility) are joined with the latter (war) and are tied together in a destruction-construction link. This division between the two great groups of gods has to do with the basic deities of nature (water, fire) as *Tláloc*, *Chalchitlicue and Xiutecuhtli* who could date back to *Teotihuacán*, and the lords of various places, linked to a people, a direction and a colour, such as *Huitzilopochtli*, *Xipe Tótec*, *Tezcatlipoca and Quetzalcóatl*.

The link between the two groups of gods and the sequence in history is crystallised in *Quetzalcóatl* who forms a part of the Toltec pantheon, and who, as god of the air, helps *Tláloc* bring the rain and by fulfilling his purpose as god of the priesthood is linked to the ancestral gods (Kirchhoff 2002: 422).

Meanwhile, Clajivero (Clavijero 1985: 226-238) divides them into: 1. Gods of Providence and Heaven: 2. Gods of the mountains, water, fire, earth, night and Hell 3. Gods of war 4. Gods of commerce, hunting and fishing. In this last item he includes the 'god of salt', widely recognised, as he says, by the Mexica since they had so many saline places close to the capital.

Not all the gods were equal; they were composed in various proportions of cold, dark and humid or hot, luminous and dry substances. From their differences, the diversity of the world is derived. The fundamental difference resides in the division of the *Cipactli*, so that the gods who came from the upper half of its body were hot, dry, luminous, and those of the lower half cold, humid and dark. Their actions upon the world were performed at regular intervals (López Austin 1994: 25-31).

Meanwhile, the gods ascribed to the guilds and associated with natural phenomena and everyday life —as is the case with the goddess of salt— were linked to the pantheon of divinities, distinguished by the priests who formalised the cult during the monthly celebrations, signifying the sacralisation of time (Báez-Jorge 1988: 92).

The principle of duality that represented contrary opposites such as life/death and the beliefs regarding the individual as having several souls, each one with

a different function and a different destination after the death of the individual, permeated the thought of Mesoamericans.

Because of their military character, the gods of the Post-Classic had warlike attributes based on religious ideas and in their life/death cycle man was the intermediary of the gods, in the sense that gods decayed in the same way that nature did as they fulfilled their purpose upon the world, and as such they had to be nurtured with human blood, in such a way that their revival was achieved through their own death, thereby showing the capacity to inhabit the bodies of men.

The former refers to 'restitution', and López Austin (López Austin 1994: 204-205) points out that there were rituals destined to return to the gods all the necessary forces to produce what they received. The return had to be made through a way of the same nature as what was returned and the living image was the most effective way: 'a human being who has been transformed into a man-god, who is filled with the divine power he represents, dies so that the power may return to its destiny.' Without worship the cycle would be interrupted, since the restitution and/or the religious ritual operate under the supernatural forces that propitiate the eternal return of the reproduction that the human being needs to live.

The former is directly related to the way in which the rituals were organised, since the prisoners of war were dressed with the marks of the gods and once turned into them they transfigured into divine images, at which moment they could be sacrificed; that way the god inside them died during the ceremony, but was reborn once more. The gods were warriors and the earth and the sun were to be fed with the blood and hearts[12] of men (López Austin 2002: 80-85). Krickeberg (Krickeberg 1975: 158) points out regarding this that the human victims destined to sacrifice were not the food of the gods but the gods themselves, who during the sacrifice achieved an identification between the human being and the god, and that upon dying, the gods were reborn. The underlying idea between these practices was that the victims were turned into the same god, personified him, took his name, his garments and his attributes, and as such, the population worshipped them in the same way (Kirchhoff 2002: 427-429).

In line with these beliefs, during the Post-Classic a notable increase in sacrifices was recorded, seen by López Austin (López Austin 1994: 33) as a way in which the forces of the cosmos move through human sacrifices, (although this is not the only nor the most important way of transit for the essence). The Mexica were convinced that it was not a punishment but rather an honoured task, for which there were strong punishments for those who did not accept this distinguished position (Krickeberg 1975: 149). These were performed according to the ritual calendars under which they operated; the victims could include women, men or children, who in some cases were entertained, in others drugged, and in others where the intention was to cause them terror, they were left to die.

At every festivity the number, place and way in which the sacrifice was to be performed was determined. The most common thing was to open their chest and extract their heart; but they were also drowned in lakes, others were imprisoned in caves where they starved to death, or in gladiatorial sacrifice (Clavijero 1985: 256). They were also decapitated and their head skewered onto the *tzompantli*;sometimes they were burned at the stake; in other cases they were shot with arrows, thrown from very high posts, or skinned after being sacrificed (Kirchhoff 2002: 428). The Nahuas from the Basin of Mexico tended to sacrifice an infant during their ceremony to plead that the rain season would be successful, the idea being that, the more copious the child's crying, the more beneficial the rain season would be (Osorio Ogarrio 2008: 56). Men considered that through the manifestation of their power the gods were fickle and that arbitrary will could benefit or hurt them. Because of this they loved them, but at the same time they feared them, so that, when asking them for favours, they offered them rituals and offerings in a cyclic way, with human blood and life being notable as the most favoured by the gods. The prisoners of war destined for sacrifice were dressed with the god's symbols, with which they achieved their divinisation and could then be sacrificed (López Austin 2002: 66-81).

As for the priesthood, the high chiefs fulfilled the double purpose of priests and military men. There was a great number of priestesses and priests specialised in worship who performed various functions around them. According to hierarchy, there were two main priests, one representing *Huitzilopochtli* and the other *Tláloc*. A main priest ruled over the other priests, considered lesser, and corrected the laws and customs of their predecessors. One of the most important tasks they performed was that of education, but there were also the sacrificers, those devoted to divination, the arrangement of the calendar, mythological paintings, others were composers, and others chanted the hymns. There were those who cleaned the temples and adorned the altars, others were always attentive to the fulfilment of rituals according to the annual calendar, and others acquired the paper, the copal, the torches, the raddle, the ink, the *cotaras* (cotton shirts), the *jaquetas* (jackets), and the sea snails to garnish the festivities.

[12] 'The heart must be understood not only as the essence that its nature gives to things, but as the force that the ancestors —those who transited from the divine nature to the mundane at the origins of time— give to the creatures of this world that they may grow and reproduce' (López Austin 1994: 170).

The priestesses —many of whom were raised in the temples— put incense on images, kept the sacred fire lit, swept the temples, prepared the offering of food and presented it to the altar. They could not make sacrifices or occupy higher ranking positions. Although there were those who dedicated their life to the priesthood, it was not a lifelong activity; the average serving time was two years. There were punishments for those who did not fulfil these religious duties (Alcina Franch 1992: 267; Caso 1946: 348; 350; 1976: 107; Clavijero 1985: 252-253; Sahagún 1975: 168-169).

Regarding the architecture, we see that men built upon the earth replicas of the cosmos and of mythical sites, and the pyramids were structures that reproduced the shape of the hills. At the centre of religious, political, social and economic life were the stairwell-bearing structures. The higher ones were built with the intention of representing cosmic mountains and it was there where most of the rituals took place, although the most noted religious space for those events was the ball game (Kirchhoff 2002: 442; López Austin 1994: 171).

The main temples known as *Teocalli* (house of god) and *Teopan* (place of god) were reserved for religion; there the worship of the gods and pleas for protection were performed. The buildings represented an expression of the greatness and identity of the social-political unions and were respected as the homes of the particular gods who were honoured there. It was customary for sacrifices to be performed on the superior atrium of the temples (Clavijero 1985: 240; 253; Lockhart 1999: 341).

The grand temple of *México-Tenochtitlán* had two temples at its apex, one dedicated to *Tláloc* and the other to *Huitzilopochtli*, before each one there were altars where sacrifices were made in their honour (Sahagún 1975: 158). Matos (mentioned by López Austin 1994: 171) places *Huitzilopochtli* on the South and *Tláloc* on the North and assures that this duality represented the union of two mountains. of which the north area corresponding to *Tláloc* belonged to the mythical 'mount of maintenances'. Regarding their relation to the water, Castellón (2015: 66) thinks that the hills and pyramids were places through which water circulated and through there communication with the sea was established, where the sea was seen as representing the greatest body of water and fertility.

In Mesoamerica there were two calendars that were interconnected, regulated the interrelation between gods and men, and determined the precise months and days during which religious actions had to be performed. On one hand, the *Tonalpohualli* dealt with ritual and religious life, fixed the ceremonies and contained divinatory astrology. On the other, the *Xiuhpohualli* controlled agricultural cycles based on solar movement and established the beginning and ending cycle of humanity every 52 years. The former had 260 days and the second 365 with 5 unlucky days (or *nemontemi*) divided into 12 and 18 periods of 20 days, respectively. The months were dedicated to the greater gods and during each of them ceremonies meant to symbolically represent the god's lifestyle were performed (Caso 1946: 357; Kirchhoff 2002: 426; 443).

As for the festivities, Kirchhoff (2002: 392) proposes grouping them into 6 simple ones and 6 double ones, a common pattern across Mesoamerica, which suggests a single religious origin. These 12 festivities can be concentrated into 4 blocks with similar themes, and 3 great types of gods: the deities of water and lordship, the gods of constructive and destructive power, and the deities of fertility.

The festivities represented real religious dramas where active and passive actors participated, with an emphasis on the priests, the representatives of the gods, and the prisoners destined to sacrifice, who personified the periods of nature so that, through magic, the rituals would be channelled to the protection and benefit of human beings (Krickeberg 1975: 159).

The goddess of salt

The Mexica thought that there were two planes in the world: the horizontal, where 4 directions were recognised, and the central or vertical region, and in this one, the upper part took up 13 heavens[13] while in the lower one the home of the dead was housed in 9 levels of the underworld. Both were symbolically related in the earthly world, having before them the phenomena of birth and death.

In the Codex Vaticanus A (Codex Vaticanus A, 1996: 141) the division of the universe into three levels is recounted: heaven, the earth, and the underworld; the first was related to the number 13, the second to 4 and the last to 9, each having a colour and a special sign.

In that spatial structure the gods resided, and in the fourth heaventhe home of the goddess of salt was located. Alcina Franch points aut (Alcina Franch 1992: 268) that *Ilhuicatl Huixtotlan* was the heaven of salt, which rose up as a circular wall until it reached the heavens, and there lived *Huixtocíhuatl* the goddess of the brackish waters.

The goddesses were always present in the Pre-hispanic religious background[14] and just like the gods had a

[13] León-Portilla (1966: 114) points out that the Nahua considered these heavens as cosmic regions which overlapped and were separated by a series of floors or roads through which the celestial bodies moved.

[14] We can mention: *Tonantzin* 'our venerable mother'; *Teteo Innan* 'mother of the gods'; *Coatlicue* goddess of the earth; *Cihuacóatl Quilaztli*

feminine counterpart, so the goddesses could unfold into their masculine counterpart. The goddesses of this period were seen as expressions of the numinous essence of Mother Earth (Báez-Jorge 1988: 97; Caso 1976: 21).

Huixtocíhuatl the salt goddess is located near the water, be it on the sea or salt lakes, recognised as a lesser water goddess, and related to the gods of water and vegetation, all presided by *Tláloc*, ancestral god of rain and lightning. *Chalchitlicue*,consort of *Tláloc*, in accordance with her attributes as a goddess of the sea and the lakes, is notably close to the salt goddess. Regarding this, the Codex Vaticanus A (Codex Vaticanus A 1996: 41) confirms that the iconography of this goddess as a patron of the lakes and rivers shows various similarities with *Huixtocíhuatl.*[15] It is said (Ceja 2009: 35; Codex Vaticanus A 1996: 214; Codex Telleranio-Remensis 1995: 139; De Mendizábal 1946°: 326; Reyes Garza 2000: 197; Sahagún 1975: 119) that *Huixtocíhuatl* was an older sister of the gods of the rain or *Tlaloques*[16] who after various estrangements chased after her and banished her[17] to the salty waters, where she invented the way to obtain salt, gathering it in pools and concentrating it in jars. Graulich (Graulich 1999: 375-377) points out that the separation between *Huixtocíhuatl* and her brothers caused a lack of rain, because of which she was expelled to the salt waters. These *tlaloque* not only didn't tolerate salt because of the division they had had with *Huixtocíhuatl*, their sister, but also because they knew that salt had been obtained from the armpits, blood and tears of the goddess, which was interpreted as sinful and opposite to the purified waters (Castellón 2015: 60).

It is necessary to emphasize the role the *uixtotin* Olmecs' 'spirits of primordial times, at the beginning of history', according to Graulich (Graulich 1999: 375-377), played not only in the ceremonies, but also in the salt extraction processes. As Olmecs, the Bishop Plancarte places them in the third sun. They began their pilgrimage at the Pánuco under the command of their guide *Olmécatl Huixtotli*, with Guatemala as their destination, but according to Kirchhoff (both cited by López Austin 1994: 52-54) their destination was instead the Basin of Mexico, where, at the foot of the volcanoes, they founded Tamoanchan, and later were expelled by the Totolimpanecs. They continued their return to the Gulf Coast where they took the name of *uixtotin*, which alludes to the trade of making salt and, therefore, are those who worship the goddess of salt (López Austin 1994: 52-71). The Codex Telleranio-Remensis (mentioned by Castellón 2015: 57-73) mentions the *uixtotin* as a part of the *Ochpaniztli* celebrations.

Ceja (2009: 31-36) discusses the former and, based on Sahagún, points out that the Olmecs are Toltecs not in the sense of ethnic group nor by their geographic location, but are seen as officers, in this case specialised in the acquisition of salt during the Post-Classic. Although they speak Náhuatl they are distinguished by their inadequate handling of the language, in spite of which they are recognised as official salt makers. Additionally, the people of the coast are named this , as well as those who function as priests and/or captives who accompany the goddess in her celebration.

The goddess of salt, with blue and white as her symbolic colours and the white reed cane as her attribute, was celebrated in the month of June, surely because it's the time of year in which the tides flood the tidelands and natural saline places are formed there, especially on the Southern coast of the Pacific Ocean. She was worshipped by all the Nahua peoples; her cult was popular and participated in by the salt makers and merchants, being grateful for control of the salt works, their use and distribution, as elements of economic stability and dominion. It is told that she was much celebrated by the inhabitants of the banks of the lagoons of the Basin of Mexico because they were all salt makers. She would have instructed them to recover the salt, process it into thick or fine, obtain round and/or elongated loaves, as well as keep it in pitchers and/or sacks to be sold or surrendered as tribute. She also taught them to cure abscesses with salt, to preserve foodstuffs, to clean teeth, to tan hides, and to polish metals. For these reasons she was their advocate and patron. The ritual calendar was very intense and there were festivities all the year round. The goddess of salt was celebrated during the seventh month, known as[18] *Tecuilhuitontli* (data also cited by Ceja 2009: 31; Castellón

female warrior who helps in childbirth and imposes to mothers the tribute of death during childbirth; *Chalchitlicue* goddess of water, receives and cleans newborns; *Toci* goddess of childbirth, of *temazcal* and generator of earthquakes; *Yoaltícitl* 'nocturnal medic' also called *Yamaniliztli*; *Xilonen* goddess of sweetcorn; *Chicomecóatl* goddess of ripe corn; Huixtocíhuatl 'woman of salt' goddess of the sea; *Atlan Tonan* 'out mother of the place of water' causes and cures cold diseases; *Xochiquetzal* goddess of love; *Tlazolteotl* goddess of sexual sin; *Mayahuel* goddess of the moon and pulque, *Itzpapálotl* goddess of aquiferous and underground fertility (Caso 1976: 19; 59-67; López Austin 1994: 193-194).

[15] Water according to Heyden, 1983: 58, possessed distinct qualities which distinguished it, lagoons and still water deposits, for example, were considered feminine and related to Chalchiutlicue, while the rain had a more masculine character and was associated with Tláloc.

[16] López Austin 1974: 178, considers that the *tlaloque* who sent the rain to the different ways of the earth were located at the four corners of the world serving as columns to support the sky. Alcina Franch 1992: 251, meanwhile opines that the four supports of the heavens are the four directions in which the earth is divided and they may be represented as sacred trees, or as the four great tlaloques who sent the rain.

[17] In 'ancestral times when the gods fought among themselves, one of them almost always female was thrown far, into the subterranean world, until the saltwaters that form the sea, an enormous and primordial body of water to which offerings must be made from their multiple connections on earth to slake its fury and obtain one of their most precious products' (Castellón 2015: 80).

[18] In the documents mencioned the name of this festivity is written in the following ways: Tecylhuitzintli; Tecyl huitzintli; Tecuilhuitl; Tecuilhuitontli; Tecuil huitontli; Hueytecuilhuitl; Tecuilhuitonli; Veytecuilhuitl; Hueytzquilquitl; Veiquilquitl; Hueyteuilhuitl; Tecuihuitom; Tecuihuitzintli.

2015: 57; 69-70; Codex Vaticanus A 1996; Codex Tudela 1980; Codex Duran 1990; Codex Telleranio-Remensis 1995), which is translated,according to Durán (1967, vol. I: 263), as 'small celebration of the lords' or 'little party of the lords', specifically the 29th of June. Veytia (Veytia 1944: 48) meanwhile transcribes it as 'small celebration of the lord', clarifying that the word is composed of the voices '*tecuhtli*' which means gentleman, '*Ilhuitl*' party and '*Tzintli*' reverential and diminutive, together meaning 'party of the little gentlemen or the young gentlemen'. According to Clavijero (Clavijero 1985: 279) the celebration began on the 26th of June.[19] The Codex Tudela mentions two dates: 2nd of June (according to Sahagún) and 18th of June (according to José León Gama) (Codex Tudela 1980: 63). Torquemada (Torquemada 1983, Vol. 3: 386-424) places them on the 4th of June, and translates it as 'minor celebration of the gentlemen and lords'. The Codex Vaticanus A (Codex Vaticanus A 1996: 214; Codex Duran 1980: tercera época, s/p.)[20] places it on the 24th of June and mentions that it was known as 'small celebration of lords', the last same as the Codex Duran.

Clavijero and Torquemada (Clavijero 1985: 279; Torquemada 1983, Vol. 3: 386-424) concur that in this month, while the nobles trained for war, the townspeople went hunting and fishing. Regarding this, Báez-Jorge (Báez-Jorge 1988: 94) points out that the former has to do with the hierarchy that existed in celebrations, since while the *pillis* participated in the festivities related to military aspects, the *macehuales* were concentrated in rites concerning nature.

According to Durán (1967, Vol. I: 263) the celebration held little solemnity, without meals or human sacrifice, which differs from other authors, such as Torquemada (Torquemada 1983, Vol. 3: 386-387) who points out that it was a great celebration where women of all ages wore crowns of flowers on their heads with the estafiate herb or *iztauhyatl* (distinctive of the salt deity) and came together in the temple of *Tláloc* to dance in a circle, their hands joined by flower ropes, day and night. The dancing and chanting was directed by two old men. In the centre danced the woman representing the goddess, who could be recognised because she bore all her attributes and vestments; she danced until the moment of her sacrifice and death, all in honour of the goddess. The sacrifice included prisoners who were immolated at regular intervals; at sunset came the the woman's turn, image of the goddess; and when the sacrificial ceremony ended there was a great celebration.

Sahagún (1975: 120) recounts this festivity in a similar way and provides more data, such as that the ritual lasted for ten days; that the women danced and chanted along with the representative of the goddess for all these days, without sleeping or resting to gladden the goddess. These women were those who made the salt. The prisoners called *uixtotin* also danced and stayed awake, and like the priests they were dressed with attributes of the eagle; all of them had to die before the representative of the goddess. Those who attended the celebration bore *cempaxúchitl* flowers; the sacrifice was performed in the temple of Tláloc and the heart of the sacrificed woman was offered to *Tonatiuh*, the sun, while bugles and conch shells were played. At the end of the ceremony everyone ate and drank pulque in their homes. Motolinia (1979: 38) narrates the ceremonies in the same way and adds that the lords and main priests who bore on their hands the *cempaxúchitl* flowers also danced, that the sacrifice was at nine in the morning and that in it a lot of incense was burned. To the previous data are added the data provided by the Codex Vaticanus A (Codex Vaticanus A 1996: 215), where it is pointed out that the festivity was celebrated by the lords who at the event's end gave abundant food and drink to all the people.[21]

In the First Memorials of Sahagún the celebration of *Tecuilhuitontli* or 'small celebration of the lords' is narrated, wherein the image of a woman with the attributes of the salt goddess is represented inside a *teocalli*, leaning slightly downward to the right, and at the feet of the *teocalli* another female image is drawn. In Reyes Garza's opinion (2000: 200) the former is the representation of the goddess, and the latter represents the goddess during the sacrificial ceremony in honour of the deity.

In her honour ritual abstinences of salt were performed, with those of the priestly caste being particularly extreme (Mendizábal 1946: 750). Regarding this, Castellón (2015, 60) points out that the priests of Tehuacán didn't eat salt, or peppers, given that they believed they intensified sexual desires; they also didn't eat fish, all as an act of penitence, and they only consumed a single tortilla.

[19] This date coincides with the high tide which fills the lagoons of Tehuantepec in Oaxaca, the same which originates the salines of the southern coast of the Pacific Ocean.

[20] Codex Vaticanus A, 1996: 214. Codex Duran, 1980: tercera época, s/p.

[21] The Codex *Ixtlilxóchitl*, 1996: 56-57, mentions the celebration, *Tecuilui [ton] tl [i]*, term which is translated as 'small celebration of the lords', there are no references to the goddess of salt, nor is an approximate date of her celebration given. In it, it is said that the young men dressed with cloth garments in the fashion of a net, embroidered with 'red eyes' and crane feathers on the head. They were accompanied by *Tlazolpilli*, god of corn and flowers, whom they carried in biers decorated with corn cane; he was dressed as a parrot and bore a *yolotopilli* in his hand —characteristic of the gods of flowers and the pleasures—, when he passed, conch shells rang. As it is possible to appreciate, the description he makes is completely different from those mentioned above.

Figure 2. Huixtocíhuatl. Goddess of Salt (Caso 1976: 63; León Portilla 1992: 136 both after Codex Matritense, VIII, 21).

The attire of the goddess was related to the water element. Sahagún (1975: 119) points out that her body and face were of a yellow colour; she carried a paper hat with white down and a plume of green quetzal feathers, fine golden earmuffs. On the *huipil* and the *nahuas* had embroidered representations of the sea waves and painted *chalchihuites*, and on her feet she had tied bells of gold or white shells held by a strip of feline skin. The sandals and ties were of cotton. She held a buckler with leaves of the *atlacuezona*[22] herb, with parrot, eagle, *zacán* and *teoxólotl* feathers. In her hand she had a reed and rubber cane garnished with three paper flowers, incense, and *quetzal* feathers.

Besides linking her to the sea coasts and the lakes, León-Portilla (León-Portilla 1992: 137) reproduces the description that the goddess's attire is narrated in the Codex Matritense of the Real Palacio, in the following way: 'Her yellow face paint, her paper hat with plume of quetzal; her golden earmuffs. Her shirt with water images and her kilt with water images; her bells, her sandals. Her shield with a water flower. She has in one hand a reed pilgrim's staff'. In this document the absence of the water herb *atlacuezona* in the buckler, the bells and the white shells on the feet is noted.

A white personage with a similar attire to that of the goddess of Salt in the Codex Vaticanus Latinus (cited by Castellón 2015: 70-71) is also described in the following way: she has yellow paint on her face and her body, a headdress of quetzal feathers, white downs and golden bells on her feet and on the *huipil*, her cane is of reed with pendants. The design of the *huipil* in a blue tint is in the shape of a rhombus with a central point, with paper ornaments and pendants on the headdress and on the back.

I only found one reference about a male salt god. Another regarding the *Ochpaniztli*ceremony where *Toci* our grandmother is the goddess of salt (Clavijero 1985: 10-19). Finally, in the Codex Vaticanus A (Codex Vaticanus A, 1996: 161), she is associated with *Ixcuina* goddess of cotton, lady of salt and of shamelessness. It is said that all those born under her sign would be thieves or bad women.

In relation to the other activities of the goddess, Kirchhoff (2002: 404) points out the participation of the goddesses, *Xochiquetzal* (goddess of water), *Huixtocíhuatl* (goddess of salt), *Xilonen* (goddess of corn) and *Atonan* (our mother of water), in the celebration of the request for water, where the main personality was *Tezcatlipoca-Tlamatzíncatl*. Regarding this, Caso points out that it is performed in the month *Toxcatl*, first month of the year, although in 1976 he corrects himself and points out that because of its symbolism it corresponds to the sixth month (Caso 1946: 358; 1976: 91), when a captive who represented *Tezcatlipoca* was dressed up and as part of the ceremonies was married with four damsel-goddesses: *Xochiquetzal*, *Xilonen*, *Atlatonan and Huixtocíhuatl*. This activity is also mentioned by Báez-Jorge (Báez-Jorge 1988: 109; Tena 2008: 108) and by Tena, both authors agreeing that the celebration of *Toxcatl* took place during the fifth month. Finally, to the triad of goddesses *Chicomecóuatl*, *Chalchitlicue* and *Huixtocíhuatl*, for maintaining the townspeople, was attributed the quality of sustenance (Caso 1976: 57-61; Ceja 2009: 32; Sahagún 1975: 119).

Final comments

In the prehispanic Mexico of the Post-Classic in the Basin of Mexico, salt played a fundamental role in the nutrition of individuals since it was considered a basic food alongside peppers and corn. It was also used to political, economic and religious ends.

The appropriation of the salt works, especially those that were located along the Coast of the Pacific, where they are very abundant, made it possible for groups

[22] Derived from *Atlacuetzonan* which means mother of the waves (Castellón 2015: 70).

that possessed them to negotiate the well-being of their inhabitants through commerce and exchange, producing conditions of wealth and status, and, of course, of protection of the resource from other groups, which, in some cases, caused confrontations.

In the lagoons that surrounded México-Tenochtitlán, saline deposits were also abundant and appreciated, although myths talk of their threats to order and their danger. Their use from earlier times consolidated as an industry in the Post-Classic. This ensured its supply through the resulting extensive commercial networks but also secured dominion of the region, which the Mexica capitalised on since in this way they had the possibility of controlling the roads and thereby avoid supplying salt to their enemies. At the regional markets there was always salt for exchange and in certain transactions it functioned as currency. It was also a tribute given to the *tlatoanis* who consumed it, and they in their turn used it as one of the precious objects they gave to their counterparts as a gift.

Being influential in all aspects of society, religion also considered salt to be important in the lives of the Mexica, representing it within its pantheon of deities. Although for the moment it is not possible to determine with certainty her kinship with the water gods, it is possible to point out that her attributes linked her to water and fertility, suggesting that she could have been an older sister of the *Tlaloques* and therefore a daughter of *Chalchitlicue* and of *Tláloc*. She is mentioned as a bride of *Tezcatlipoca*, although this is surely related to the *Toxcatl* celebration, when she and three more goddesses were married to this god as part of the festivities.

Her celebration was performed during the seventh month, *Tecuilhuitontli*, where on one hand the *pillis* reinforced their abilities in war and the *macehuales* in hunting and fishing. It was in the month of June, which coincides with when the tides rise and leave great layers of salt on the coasts, which later supplied the salt makers through solar evaporation or fire. In the celebration, the salt maker women danced and surrounded the representative of the goddess, who personified her and, by being sacrificed she was not seen as food of the gods, but as a connection between the human being and the goddess, who was then reborn. In this way, her heart offered to the sun gave new breath to the goddess to keep benefiting the *Iztlateros*, those who worked the salt. This goddess fulfilled her purpose by teaching the Mexica the way to recover salt, process it and exchange it, reasons for which she was the patron and protector of those who worked and sold the salt. From the former, it can be discerned that salt had a meaningful role in nutrition and in the economic, social and political life of the Mexica.

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References

Alcina Franch, J. 1992. La Cosmovisión mexica en el contexto de Mesoamérica. *Congreso de Historia del Descubrimiento* I: 241-284. Madrid.

Báez-Jorge, F. 1988. *Los oficios de las diosas. (Dialéctica de la religiosidad popular en los grupos indios de México)*. Xalapa, Universidad Veracruzana.

Boehm de Lameiras, B. 1986. *Formación del Estado en el México Prehispánico,* Zamora, El Colegio de Michoacán.

Caso, A. 1946. Importancia y características de la religión. In J. Vivó (ed.), México Prehispánico. Culturas, deidades, monumentos: 348-360. México, Editorial Emma Hurtado.

Caso, A. 1976. *El pueblo del sol*, México, FCE.

Castellón, B. 2008. Entre cactus y barrancas: constructores de terrazas y productores de sal en el sur de Puebla. In B. Castellón (ed.), *Sal y Salinas: Un gusto ancestral. Diario de Campo*: 105-115. México, Instituto Nacional de Antropología e Historia.

Castellón, B. 2015. El Mar y la Sal: una relación necesaria con tierra adentro. In G. Pinzón and F. Trejo (eds.), *El Mar: Percepciones, lecturas y contextos. Una mirada cultural a los entornos marítimos*: 55-81. México, Instituto Nacional de Antropología e Historia.

Ceja Acosta, J. 2009. La Huixtocíhuatl, diosa de la sal o la problemática de las identidades salineras en la región sureste veracruzano en el Posclásico, *El Alfolí* 6: 30-39.

Ciudad Real, A. 1976. *Tratado curioso y docto de las grandezas de la Nueva España. Relación breve y verdadera de algunas cosas de las muchas que sucedieron al padre fray Alonso Ponce en las provincias de la Nueva España siendo comisario general de aquellas partes*. México, National Autonomous University of Mexico.

Clavijero, F. J. 1985. *Historia Antigua de México*. Xalapa, Universidad Veracruzana.

Codex Duran. 1990. Arrendadora Internacional, México.

Códice Ixtlilxóchitl 1996. Viena-México, Akademische Druck-und Verlagsanstalt. FCE.

Códice Vaticano A 1996. Viena-México, Akademische Druck-und Verlagsanstalt. FCE.

Códex Telleriano-Remensis 1995. Austin, University of Texas Press.

Códice Tudela. 1980. Madrid, Ediciones Cultura Hispánica.

Díaz del Castillo, B. 1976. *Historia de la conquista de la Nueva España.* México, Porrúa.

Durán, D. 1967. *Historia de las indias de Nueva España e islas de tierra firme 2*. México, Porrúa.

Gibson, C. 1967. *Los aztecas bajo el dominio español. 1519-1810*. México, Siglo XX.

Graulich, M. 1999. *Ritos aztecas. La fiesta de las veintenas.* México, Instituto Nacional Indigenista.

Hassig, R. 1985. *Comercio, tributo y transportes. La economía política del Valle de México en el siglo XVI. México*, Alianza Editorial Mexicana.

Heyden, D. 1983. Lo sagrado en el paisaje, *Revista Mexicana de Estudios Antropológicos* 29: 53-65.

Kirchhoff, P. 2002. *Escritos selectos. Estudios mesoamericanos. Aspectos generales* I, México, National Autonomous University of Mexico.

Krickeberg, W. 1975. *Las antiguas culturas mexicanas*. México, FCE.

León-Portilla, M. 1966. *La Filosofía Náhuatl estudiada en sus fuentes* México, National Autonomous University of Mexico.

León-Portilla, M. 1992. *Ritos, sacerdotes y atavíos de los dioses*, México, National Autonomous University of Mexico.

Lockhart, J. 1999. *Los nahuas después de la conquista. Historia social y cultural de la población indígena del México central, siglos XVI-XVIII*, México, FCE.

López Austin, A. 1994. *Tamoanchan y Tlalocan.* México, FCE.

López Austin, A. 2002. *Breve historia de la tradición religiosa mesoamericana.* México, National Autonomous University of Mexico.

López A. A. and Leonardo, L. L. 1996. *El pasado indígena*. México, El Colegio de México/Fideicomiso Historia de las Américas/FCE.

Mateos, S. 1946. Cuadro sinóptico de los panteones mesoamericanos. In J. Vivó (ed.) *México prehispánico. Culturas, deidades, monumentos*: 542. México, Editorial Emma Hurtado.

Mendizábal, O. 1946. La distribución geográfica de la sal. In J. Vivó (ed.) *México prehispánico. Culturas, deidades, monumentos*: 742-753. México, Editorial Emma Hurtado.

Mendizábal, O. 1946a. La influencia de la sal en los grupos indígenas de México, *Obras completas* 2: 321-333. México, Talleres Gráficos de la Nación.

Monzón Flores, M. 1991. Las salinas en el Obispado de México. In B. Barba, Agripina, G., Angelina, M., Perla, V., Amalia, C. Celia, I. and Emma, P. R. (eds.) *Homenaje a Julio César Olivé Negrete*: 543-560. México, National Autonomous University of Mexico.

Motolinia, T. 1979. *Historia de los indios de la Nueva España. Relación de los ritos antiguos, idolatrías y sacrificios de los indios de la Nueva España, y de la maravillosa conversión que dios en ellos ha obrado. México*, Porrúa.

Muñoz Camargo, D. 1972. *Historia de Tlaxcala*. México, Innovación.

Navarrete, C. 2008. El origen de la sal en la tradición oral de San Mateo Ixtatán, Guatemala y la peregrinación de los zapalutas. In B. Castellón (ed.), *Sal y Salinas: Un gusto ancestral,* México: *Diario de Campo*: 143-151. México, Instituto Nacional de Antropología e Historia.

Osorio Ogarrio, V. Á. 2008. El recinto de las esculturas y su posible vínculo con un ritual salinero. In B. Castellón (ed.), *Sal y Salinas: Un gusto ancestral,* México: *Diario de Campo*: 51-57. México, Instituto Nacional de Antropología e Historia.

Reyes Garza, J. C. 2000. La sal en los Códices Pictográficos. *Estudios de Cultura Náhuatl* 31: 197-213.

Sahagún, B. 1975. *Historia general de las cosas de la Nueva España*. México, Porrúa.

Tena, E. 2008. *El calendario mexica y la cronografía*, México, Instituto Nacional de Antropología e Historia.

Torquemada, J. 1983. *Monarquía indiana 7*. México, Universidad Nacional Autónoma de México.

Veytia, M.. 1944. *Historia antigua de México* 2. México, Leyenda.

Williams, E. 2008. Producción y comercio de la sal en Michoacán antiguo. In B. Castellón (ed.), *Sal y Salinas: Un gusto ancestral,* México: *Diario de Camp*: 41-49. México, Instituto Nacional de Antropología e Historia.

Making Salt in Maras (Cusco, Peru): Traditional Salt Production Systems in the Context of Heritage Economy

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Abstract

During the last few years, the Maras salt mines have become a must-see location on all tourist itineraries beginning in Cusco, in the Peruvian Andes. Nowadays, the terraces consisting in salt water evaporation surfaces are considered to be a common tourist attraction, among traditional options such as Machu Picchu and the surrounding visiting spots one might encounter—aside from the monuments and archaeological sites of the Andean capital—on the Sacred Valley of the Incas route.

This paper proposes an analysis of the heritagization process undergone by the Maras salt pans over the last twenty years. This activity, which, until recently, focused on obtaining salt for general use and for regional interchange (in the form of barter), has undergone a series of changes. The transformations apply not only to the manufacturing procedures, but also to the monetary value of the finished product and to the way work is organized, rendering it a valuable touristic attraction. The current example provides, thus, an interesting reference in order to evaluate the challenges brought on by the contemporary use of traditional salt production systems.

Keywords: Salt production systems, Maras (Peru), Heritage economy.

Introduction

The visit to the Maras salt mines (locally known as *salineras*) has over the last decade been listed among the activities included in the tourist package that revolves around the Andean city of Cusco, Peru. Unlike the majority of the places that make up this tourist destination, defined by the archaeological sites from the pre-Hispanic era, the ravine where the terraces for salt production are located has been a place of economic activity since long before the massive arrival of visitors. The heritagization[1] process undergone by the Maras salt mines has generated some unprecedented dynamics in the district that not only imply an additional source of income for part of its neighbours, but also some significant changes in the technical procedures and in the use of salt as a consumer good.

The aim of this paper is to show the difference between the current activities of the Maras salt mines and the situation of the salt production thirty five years ago, when an ethnography was carried out on the technical procedures used and the importance of the salt in the rural economy of the inhabitants.[2] The historical analysis allows for an interpretation of these transformations carried out with a certain perspective and for the identification of some characteristics of the artisan production of salt in the context of the new heritage economy.

Salt in the rural economy of Maras

In accordance with archaeological evidence and documents, the exploitation of a salt water spring for the production of salt in the Andean district of Maras goes back to the prehispanic era.[3] The spring, located in a small ravine of Kachirakay, flowing into the river Urubamba and located approximately 2900m above sea level, has a high production potential: its flow is estimated at about 10L per second and contains 4.8Tm salt per hour (Bueno 1947). The distance between the salt mines and the capital district (approximately 4km) reveals, however, that the salt industry over time has constituted a complement to other sources of income for the local population. Founded as a *villa* at the beginning of the invasion in 1556, in the early days of the Republic, Maras was the most important town on the trade route linking the tropical valleys of La Convencion with the city of Cusco. The construction of a paved road to the Sacred Valley, whose course was aimed at providing a comfortable circuit for the traffic of vehicles, modified the old communication

[1] Heritage is not an inherent reality, but a political construct characterized by reinvention, by the past and by identity. By heritagization we mean the enhancement of pre-existing elements, natural or cultural, through the idea of collective heritage, that is, of shared heritage.

[2] The data used in this paper comes primarily from fieldwork carried out in Maras between August and October of 1986 and from two visits in 2011 and 2014.

[3] Despite the fact that the literature on this topic repeats this argument based on indications in written sources, to this date no systematic archaeological research has been carried out to empirically document the procedures used in the past.

Figure 1. General view of the salt mines (1986).

routes used by mule drivers and their mule trains used for the exchange of products between different ecological zones and left the district isolated. This also meant being left out of the touristic development that Urubamba province was to undergo from the end of the 1960s.

In the mid-1980s, the Maras population was fundamentally peasant. Potato, barley and corn constituted the main agricultural products (to which 77% of the cultivated area was designated), whilst peas, beans and wheat were maintained as secondary crops. Along with the existence of large unproductive spaces (because of the altitude, the rugged terrain, the absence of irrigation and high salinity), access to the agricultural land was quite differentiated. Rotation and fallow periods were the only means to recover the fertility of the dry lands, and there were very few (15.6% of the arable hectares) irrigated lands.

A diversified agricultural production aimed at self-sufficiency, together with the breeding of some animals, made up the most common pattern in the context of the local domestic economy. The exchange of surplus goods for products from other ecological zones through barter allowed for supplements to the peasant diet. With the exception of a few families that had managed to capitalize on their farms, the local economy had a low monetization index, limited to the acquisition of just a few manufactured items.[4]

In this context, the extraction and sale of salt constituted complementary activities (Orlove 1996: 187). Although not all the households of the district could participate in the exploitation of the salt spring as owners, a majority of them got access to the product through the exchange of products or through direct purchases from the trading company. In both cases, salt was integrated in the diversified economy as a specific local product in the traditional exchanges of the region or facilitated, through traders and intermediaries, access to the currency.

The productive process: devices and technical operations

Flowing constantly, the water of the Maras salt spring is channelled through a complex network of canals that distribute this raw material to the different sectors occupied by distillation pans (*pozas*), covering approximately 18ha. The productive infrastructure generally includes several reservoirs (*puñoc*, in

[4] From a statistical point of view, the barley destined for the beer industry covered during that time a third of the cultivated area of the district (Van Nierkerk 1990).

Quechua), increasing in the 1980s from 5 to a total of 17. These pools, built with clay and stone and of irregular dimensions, allow storage of the salt water at night and during the productive months, and in this way increase the exploitation of the flow. Their construction and maintenance, as with the main distribution channels, is the responsibility of the joint owners of the salt mines (locally known as extractors, *extractores*).

The salt pans make up the main mechanism of the salt mines. Their shape and dimensions are adapted to the slope of the ravine (which has an average slope of 40º), leading to a multitude of staggered platforms. It is estimated that it is composed by close to 4000 terraces (Figure 1). Inside, salt water is contained in small amounts and exposed to the sun and wind, thus causing it to evaporate and, as a result, the precipitation of salt. The surface of a pond can vary from 4.5 to 25m^2. Together with a variable number of crystallizers, each unit of salt production also includes a number of *eras*: small surfaces (maximum 2m^2) where salt is piled once harvested. The repertoire of the technical elements of the salt mines is completed with some small tents covered with corrugated iron, used by the extractors for shelter.

The technical procedure developed in Maras primarily considers the marked seasonality of the rainfall that characterizes the climate of the Central Andes, where each year a dry season alternates with a rainy season (versus less contrast in temperatures and insolation) (Orlove 1982). In this context, during the dry season (normally between May and October), solar radiation and ventilation is used to cause the water that is out in the open to evaporate and the consequent precipitation of salt. The low risk of rain during these months allows for spacing the harvesting significantly. The season tends to end with the arrival of heavy rainfalls that may reach 500-600mm between the months of January and April. Thirty years ago, from the end of the rainfalls, the Extractors' Union (*Sindicato de Extractores*), used to organise collective work days to carry out maintenance work on the road that connects the urban centre of Maras with the salt mines, in addition to renovating the main channels and the reservoirs, which had been harmed by rainfall and usage. Later on, in the months of May and June, the extractors focused on repairing the secondary sections of the network of canals and on cleaning and eventually reconstructing the pans belonging to their estates.

During the campaign, the extractors irrigate their pans with salt water up to a height of approximately three fingerbreadths (5-6cm) each time that the salt from the previous irrigation has saturated (approximately every three days). In order to fill a pan (*empozar*; in Quechua, *rinucchuy*), salt water has to be made to circulate through the canals until reaching the crystallizers. In the mid-1980s, this operation was carried out, according to the convenience of each owner, outside of the peak hours of evaporation (in the afternoon, early in the morning or even at sunrise). The lack of regulation in the distribution of raw material (unlike in agriculture, where there were turns for irrigation) favoured those owners whose pans were located the closest to the spring or to the reservoirs, generating disagreement between the producers and limiting the exploitation of the resource.

Once the surface of the crystallizer had accumulated a layer of about 4-5cm of salt, a month after starting the watering cycle, sweeping (*barrida* or *cachipichey*) was carried out and the pond was again left empty and ready to receive a new batch (Figure 2). The spacing of the harvest allowed limiting the time when additional labour was required. Although weather conditions determined the evaporation rate, the amount of water irrigated per shift and the number of times the pond was filled before collecting the salt gave rise to a certain margin for each producer to set up their own management strategies based on availability of time, the size of their farm and their own working capacity. While some emphasized their preference for sweeping the pans when the water had evaporated completely (which facilitated the execution of the task), others stressed that sweeping the brine favoured obtaining a cleaner salt.

As a technical operation, the sweeping was carried out in three stages. First, the surface layer, formed by the salt when crystallizing, was broken (*aflojar* or *kuyuchir*), either with one's foot or using a tool (traditionally the *tulkina*). Then, the salt was collected with wooden boards (*cachipichana*), forming a conical pile inside the device. When it came to the brine, the board was rotated through the pond surface, causing the water to collide into the edges and separate from the crystallized salt. As the salt piled up, the water was trickling out of the stack. The sweeping ended with the transfer of the product to the *eras*. For this purpose, baskets (*ichiame* or *ichara*) or open sacks (*kaperina*) were used and filled with bare hands. While in the *eras* the salt was drying, and the pans were again available for starting a new production cycle. The sweeping required a significant contribution of labour and used to be carried out with a group of organized labour. A pond of about 16m^2 could produce about 5-7 *quintales* of salt per month (at 50kg per *quintal*, between 250 and 350kg in each sweep).[5]

[5] Beisaga (1984: 22) estimates that the average output per pan was about 3 *quintales* per harvest, but that this could be increased to up to 5 *quintales* if conservation of the devices could be encouraged (especially through the use of *contay* or white sand both at the base and the surface of the pans).

Figure 2. Salt sweeping in the pans (2016).

The transfer of the salt to the warehouses closed the cycle of operations carried out during the dry season. First, the salt piled in the *eras* was crumbled with picks or shovels and then, also with the help of shovels, using baskets or with one's hands, it was put into pouches that would serve later for selling it. The sacks, which could contain up to about 60kg of salt, were loaded on the back, fastened with ropes or folded blankets, and carried to the nearest warehouse. In the absence of roads within the production area, the loader often had to cross inside some pans or pass through the narrow passages that separate them from one another, while overcoming the steep slope. As in irrigation and harvesting, the organization of delivery (*entrega*) was the individual responsibility of each extractor. Generally, it was carried out once the *eras* contained salt of two or more sweepings (*metas*); as it was another cause for heavy work, in this way the need for additional manpower was reduced according to what could be contributed by the domestic group itself. The open bags were stacked outside of the deposits until the end of the entire operation. Then they were weighed, each about 50kg, sewn closed, and stored until their dispatch (Figure 3). Depending on the duration of the dry season, the operating cycle consisting of the *empozado*, the sweeping, and delivery was repeated the maximum number of times until, with the arrival of the rains, the end of the annual campaign hurtled (the average was 5.4 harvests per season).

The social organization of the production

In the mid-1980s, all distillation pans in the Maras salt mines were under private ownership, belonging to households living in the district capital and in the community of Pichingoto.[6] The Extractors' Union had proposed to manage titling in order to address the lack of legal documents verifying the ownership of the farms. The purchase and sale transactions and especially inheritance practices favoured the existence of both major differences between the owners and of some farms that were not viable due to their size. Although 20-25 pans could be considered as a medium-sized property, some neighbours owned up to 80 crystallizers while others only had one. Lease agreements and partnerships (*en compañía*) allowed resolving such situations. The expansion of the

[6] Andean municipal districts usually consist of several rural communities (or *ayllus*). The resident population in the district capital of Maras, Maras Ayllu, represented in the last half century (between 1,700 and 2,300 people) between a third and a quarter of the total population; the rest is distributed among seven communities.

Figure 3. A working group carrying out the entrega *of the salt (2014).*

operating area with the construction of new pans that started in 1976 allowed at the time the incorporation of 52 new owners in addition to the 180 existing ones, whilst some of these were able to increase the size of their farms to participate in improvement works.

While the irrigation of the pans was an individual task of each extractor (often delegated to underage children or other members of the household), the sweeping and delivery, on the other hand, required a significant contribution of workforce, often surpassing the labour capacity of the family. Obtaining additional labour was performed according to the same system of reciprocal exchange of services that was used in farming: *ayni* when a job was returned on the same terms (for example, a working day sweeping in exchange for a day of work in the same activity), and *minka* when the provision was given in exchange for a payment, established at that time at two *arrobas* of salt (25kg). The offering of provision during the day, as well as sharing food and drinks, helped to highlight the sociability of this type of exchange.

In 1969, the Peruvian State, after having limited itself for decades to controlling the sale of domestic salt, went on to take over the entire process of extraction, refining, processing and marketing of this product across the country, creating for this purpose the Public Salt Enterprise (*Empresa Pública de la Sal* - Emsal). Although most of the less profitable deposits were then closed, the special social characteristics related to the ownership and operation of the Maras salt mines played in favour of its maintenance. The low profitability of the operations prevented these salt pans from being expropriated and allowed for the continuity of traditional forms of ownership and production in the hands of the villagers of Maras and Pichingoto, who were forced, however, to sell their whole production to Emsal. The prices set by the state company were determined by the processing costs in the coastal salt marshes of the country that were exploited by industrial means and provided greater productivity. Thus, in 1978 Emsal paid 40 soles for a quintal of salt produced in Maras while the local population had to pay almost six times more (230 soles) to acquire the same amount of this product, without this being transformed in any way and without the salt industry reporting any additional benefit for local development.

In late 1981, after several months of conflict, with the extractors requiring an improvement in payment from Emsal for the produced salt and after receiving strong support from the District Council that demanded a fee for the benefit of the municipal funds, a 'march of sacrifice' was organized to Cusco that managed to mobilize about 1300 residents and had a major impact, on the whole favourable to local demands. On December 6th of the same year, the municipalization of the salt mines was ordered, along with the creation of a municipally-owned company (Marasal) that would

replace the previous functions of Emsal in processing and marketing the product (in order to invest the benefits in improvements and services of general interest to the district), maintaining, however, the private ownership of the installations at the hands of the extractors.[7] In the early years of municipal management (the presidential administration of Marasal rested with the District Mayor), several works and investments of public interest were carried out, among which can be emphasised the purchase of a bus for the service of daily passenger transport for the Maras-Cusco route, payment of electrification installed in 1984, improvement of the roads connecting the urban centre of the capital city with some of its communities, as well as works in different schools in the district. However, there was protest against the municipal management of the company from the outset. Along with the widespread idea (both between the extractors themselves and the locals) that a fraudulent use was made of the proceeds, a report made two years after the creation of Marasal highlighted a number of management problems that hampered the growth of the company and resulted in a general lack of motivation among the involved actors. With an estimated annual production of 32,603 *quintals* in 1982 and 49,715 in 1983 (1.63 to 2.48 Tm), deficiencies were primarily in the quality of the finished product (thereby hampering its sale for food consumption) and in the marketing system (for which direct sales by the company were proposed in the main regional markets) (Beisaga 1984).

In this new context, along with an improvement in payment to producers, in the mid-1980s a significant increase was recorded in the regional demand for salt from the Maras mines. Benefiting from a significant difference in the price of salt from other sources, most of the households in the district sought to participate in this boom, whether it was through reselling the quota they were allocated as locals or offering to work on payment of 25kg of salt as *ración*. However, even for the owners themselves, the salt was still a complementary product to other products and activities within the local domestic economy. As part of an economy fundamentally oriented towards self-sufficiency, the diversification of activities and sources of income was the most appropriate strategy to address shortages and risks.[8]

The Maras salt mines as a tourist destination

The Maras district has now become one of the highlights among the tourist destinations of the Department of Cusco. The excursion to the archaeological site of Moray and the *salineras* has been added in recent years to the traditional offering of tours starting in the city of Cusco, including Machu Picchu (the main tourist attraction of South America), the so called Sacred Valley (*Valle Sagrado*), and the monuments located in the ancient Andean capital.[9] Its location, just 50km from the capital Cusco, along with the improvement of the road that connects the town of Maras with the paved road of Cusco-Urubamba (paving of its 4km was completed in 2008) were crucial for connecting the district to the regional tourist circuit. The work done by the state agency PromPeru in the promotion of tourism to the main heritage district resources was essential to this development.[10] Currently, the number of visitors to the salt mines reaches 500 tourists a day during peak season, and is reduced to half or less during the rest of the year.[11]

Moray (Figure 4) is located at a distance of 7 km west of the town of Maras. Archaeological research has attributed to the concentric terraces of the location the function as a centre for domestication, acclimatization and hybridization of plant species for human consumption established by the Tawantinsuyu. Temperature differences between the various terraces, of up to 15° C, would have helped achieving a sophisticated level of experimentation on environmental conditions, providing Andean societies with extensive knowledge on managing climatic uncertainty in agriculture.[12] The archaeological remains of Moray were subjected to a major restoration by the National Institute of Culture (along with the conditioning of the road for easy access to the site) and are now one of the ten archaeological

[7] The conflict between the Maras salt mines, their municipal representatives and the state administration was documented at the time by the regional magazine *Sur* (1978, 1982, 1984 and 1986) and analyzed by Palomino (1986).

[8] As one salt producer said, '[it was preferable to work] *in agriculture, working on different productions. We grow potato, peas, wheat, corn ... and then we have enough to eat. And on the contrary in the salt mines we work one product: salt, only salt. So do we eat salt if we don't do well in agriculture?*'.

[9] Being subject to the acquisition of a so-called tourist ticket, there is reliable statistical data on the visits to the archaeological sites of Cusco. Between 2008 and 2010, the average number of visitors to the archaeological complex of Moray was 71,100 per year. For the latter year, the arrival of tourists to this site represented 10% of the visitors to Machu Picchu.

[10] The offer of a standard five-day, four-night stay in Cusco ('Magical Cusco') includes a tour of the city (half day), another tour of the Sacred Valley visiting Pisac, Ollantaytambo and Chinchero (full day), a tour to Macchu Picchu (all day) and another tour to Maras (half day), departing the next day. Eventually you can enjoy a half day excursion to the South Valley (Quispicanchi province) visiting the archaeological sites of Pikillaqta and Tipon and Andahuaylillas town. The Maras tour is priced at EUR 30-40 and includes transportation, guide and lunch box, to which the the cost of the ticket to the salt mines (7 soles, 2 EUR) and the whole of Moray should be added (included in the regional tourist voucher of EUR 35). Tours for small groups or by bike can triple these prices.

[11] The potential represented by the salt mines and Moray for possible development of tourism in the town of Maras was already evident in 2007, when an influx of about 200 visitors a day was estimated (Marzal, Yi and Goluchawska 2007).

[12] Documented since 1944, the interpretation of the archaeological site of Moray as an agricultural laboratory has been possible thanks to the research of the Australian anthropologist John Earls (1991).

Figure 4. The archaeological site of Moray (2011).

parks managed by the Ministry of Culture of the Department of Cusco.

The tour to Maras is invariably completed with a visit to the salt mines, at an approximately 11km drive northward from the district capital. Along with the adaptation of an open space for the parking of tourist vehicles, the construction of two viewpoints at the top of the ravine provides a visual perspective over the entirety of the production facilities, thus enhancing the spectacular nature of the site. The entry of visitors into the operating area is not restricted, but the viewpoints act as a deterrent and limit both the interference of visitors with the extractors during the campaign months, as well as any damage that could be caused to the fragile production devices. The extractors, notwithstanding, do not consider the visitors as a nuisance to the development of their tasks. Tourism services are complemented by a growing number of small establishments for the sale of souvenirs, with a strong presence of salt products, and other establishments such as cafés. The tour can be taken throughout the year, but the months of greatest influx of visitors overlap with the most favourable months for watching the salt mines in their full productive activity (in the dry season, between April and December).

The exponential growth experienced by the tourist influx to the district has, however, had a fairly limited impact on the local economy. As a closed half-day package, tourists are led directly to the two places mentioned and, although they must necessarily cross the village, they do not tend to make a stop in the town. The conventional tour does not include heritage elements belonging to the centre of Maras; however, the current restoration of the church of St. Francis of Assisi, a large construction in adobe initiated in the late sixteenth century, aims to help reverse this trend. The town also has other prominent architectural elements (as many as seven chapels and a high number of stone doorways bearing witness to the importance played by the town during the seventeenth and eighteenth centuries), in addition to an urban layout of notable interest.

The traffic traversing the centre of the town contrasts with an almost total absence of hotel and restaurant establishments and tourist shops. Programs developed by the Administration aiming to boost the local heritage and support neighbourhood initiatives have favoured some diversification in the offer of products and activities.[13] The Sol Naciente Association, created in 2010, which offers various activities related to crafts and local folklore, has been presented as an innovative

[13] In 2002 the Maras district was selected as a pilot case of the Heritage Citizenship and Development Programme aimed at developing projects for sustainable economic development through the enhancement of local heritage and culture, with the support of the National Institute of Culture and UNESCO (Benavente 2006). It is symptomatic that this initiative does not identify the salt mines as a tourist resource of first order and is geared almost exclusively to the promotion of local crafts and restoration of monuments.

Figure 5. Tourists visiting the salt mines (2011).

project in the field of community tourism but has failed to generate a truly significant activity.[14]

The company Maras Adventure, meanwhile, aims to differentiate itself from the offers provided by the largest operators linking the binomial Moray - Salt mines with experiential tourism, through proposing a two-night stay in private homes (to promote the '*life and ancestral customs still maintained by the inhabitants of the communities*' of the district). In other cases, conventional visits are combined with different forms of active tourism (such as the use of mountain bikes, horses or trekking). Despite all of these initiatives having a rather limited outreach, they do provide some direct income to some locals. This also applies to the activity of some street vendors and taxi drivers, who pick up the few tourists travelling on their own.

In any case, the recent increase of the visits to the salt mines is primarily associated with the consideration of the landscape as a whole (as is the case with Moray, despite being an archaeological site, according to its formal characteristics). Both the claims used in the promotion of tourism (where the spectacular character, beauty and uniqueness of the place are stressed) and the organization of the visit (with stops along the way to take in the view from the opposite side, or the viewpoints where tourists are invited to take a contemplative position), result in this dimension of passive consumption and an experience of contemplative nature (Figure 5).[15] In this presentation, the activity of the salt mines is valued for its alleged ancestral character and is not treated as a fully current practice.[16]

The establishment of an entry price set by the company itself has allowed Marasal to translate the influx of visitors into direct revenue for the owners of the pans. Access to the salt mines is not regulated by any agreement reached with the tour operators: all of them

[14] This initiative has been analyzed by Montoya (2013) as a case study of the development potential of community tourism.

[15] The comments written by web visitors are very eloquent in this regard: '*It's a wonderful spot, ideal for getting lost, feeling unique with nature as only company. It's a gift for the spirit!*'; '*The view of the salt mines, which highlights the white between the mountains, is impressive*'; '*It occurred to me that a piece of moon had fallen to Earth and its white remains were filled with clear water. That's what I saw (...): a moonscape*'; '*It's a magical place where tons of white salt, coppery mountain and sky blue blend together*'.

[16] To the point of stating that the exploitation of the pans '*is as old as the Tawantinsuyu*' and even that they '*have been used for thousands of years*'.

are allowed to enter the production area as long as they acquire an entry ticket for each visitor (the same payment as for a traveller arriving on their own for a visit). In addition to allowing for the construction of some infrastructure for receiving visitors on behalf of Marasal,[17] most of the money is distributed among the partners.

The changes generated by the income from tourism may alter the short-term dynamics of the exploitation of the salt spring and even potentially affect the technical procedures employed. The sharing of the benefits obtained by this activity has in recent years contributed to subsidizing the operating costs of the salt mines. According to the extractors the income generated by the sale of salt currently covers only part of the costs (although their perception is not stable in time, but rather depending on the pace of sales).

In this context, in contrast to the proportional distribution received by extractors of the revenue from the sale of the salt, according to the amount produced by each of them, the benefits of tourism are distributed equally among all members. This form of allocation has led to a growing interest in owning some pans and thus being part of the company, in addition to the growing importance of the revenue generated by visitors. Some older extractors who previously migrated to Cusco or Lima claim participation in the deal. More commonly, the progressive division of farms (often between different members of the same family, through donations or hereditary succession) has contributed to many properties losing the dimensions that guaranteed their functional viability and threatens, in the not too long term, the continuity of the farm itself.[18] According to the rules of procedure of Marasal, a minimum of two pans are required in order to participate as a partner in the company. The current management of the company considers that a form of distribution that becomes unfair to the most involved extractors must be corrected, as it poses a serious threat to the very continuity of their business.

Salt as a heritagized product

The development of the salt pans for tourist consumption is not the only transformation that has led to the contemporary heritagization process in Maras. The elaborated salt itself has undergone a significant change in its consideration as a food item. In the same context that has affected other handmade or locally produced products in the field of food, with a specific development in the case of salt, with the appearance of numerous gourmet salts and with designation of origin (Beltran 2008), the salt produced in this Andean district is no longer a product intended for agricultural and industrial use regionally, but is now considered a quality article participating on the global market.

Until the end of last century, the salt produced in Maras was primarily aimed at meeting the needs of farms (as a food supplement for livestock and with different applications in agriculture) as well as some regional industries (e.g., in the leather tanning industry, for making bread or in high voltage electrical installations). In the early 1980s, a third of the sales were going to Quillabamba to meet the demand of the valley of La Convencion, in the tropical zone of the Department of Cusco. Food consumption of this salt was at that moment minor. The lack of concern for the quality of the finished product, both by the extractors and the marketing company, represented a major impediment to reversing this situation. At the same time, public promotion of iodized salt consumption limited the possibilities of increased demand.

In the mid-1990s, with the end of the municipal management of Marasal and the passing of the company to the extractors themselves as a corporation, the company aimed for a profound change in the quality of the finished product. The intervention of UNICEF (which, as part of a global initiative for the elimination of disorders caused by iodine deficiency in childhood, campaigned against the salts from the Peruvian inland) was instrumental in the training of grocers and in establishing the iodization of salt for human consumption.[19] At the same time, a product classification was established based on its quality in order to destine it for different uses: in contrast to the existence, hitherto, of a single type of salt, a product with better conditions of cleanliness would be sought, making changes both in the manufacturing process and in further processing (storage, iodization, grinding and packaging).

The competition presented by salt from the Pacific coast of Peru and Bolivia, combined with much lower production costs, would continue to limit, however, the possibilities of expansion of the Maras salt on the domestic market. It was not until 2004, almost in parallel with the arrival of mass tourism to the salt mines, that the product began to be sold as an item aimed at the quality food market. The Lima-based company Tierra del Monte has acquired since then about 90 tons of salt

[17] The first adaptation of the area, which helped to further the bus access, the circulation of visitors and the establishment of various services, was made just over ten years ago.

[18] The number of members has grown from about 80 in the mid-1980s to 370 earlier this decade. At present there are more than 420 members.

[19] The campaign in Peru, with support from the Ministry of Health, is primarily aimed at iodizing salt from the inland salt mines (and the coast of Lambayeque) as well as conducting an intensive campaign to promote the consumption of iodized salt, especially among children.

of the highest quality annually, which, transformed into different products, is exported to several countries in North America, Europe and Asia.

Today, Tierra del Monte is only one of several companies that market Maras salt outside of its traditional area. Oriented basically towards export, Tierra del Monte produces in its facilities in the capital several food products (coarse salt in glass jars with grinders, salt blocks for cooking, organic chocolate and French fries with salt from Maras) and beauty products (oil scrubs and bath salts). Apukachi, meanwhile, only sells salt for consumption in 1kg pouches in two different qualities and is oriented to the domestic market. Kachi Wasi is a relatively recent local entrepreneurship, which also combines a food line (which, along with coarse salt and sea salt, produces different mixtures of salt with spices and herbs) and a cosmetics line (medicinal salt, bath salt, vegetable soap and oil scrubs). Meanwhile, Marasal produces their own salt products marketed directly in the region, in the shape of *sal extra* (fine or table salt), *sal primera* (coarse salt for food consumption) and industrial salt (sold primarily as a food supplement for cattle).

The weight of the advertising discourse that accompanies each product is directly proportional to the size of the market segment that is targeted and specifically aims to increase its commercial value. While the promotion of products aimed for the local and traditional consumers is less developed (using the slogans '*salt of the Incas*' and '*natural and organic salt*'), the businesses oriented towards domestic and international markets consistently emphasize the name '*pink salt*' (*sal rosada*, which has turned into a local brand label product) and in highlighting the various added values of the Maras salt according to their own trading strategies. The attributes that stand out are mainly: its quality as a 'natural' product ('*green*', '*high purity*', '*organic*'), its artisan preparation (obtained through '*pre-Incan techniques used for more than 2,000 years*') or its health-related virtues (for providing '*important micronutrients*' or '*essential minerals*'). Faced with the more conventional presentation used for the salt produced industrially, references to the place and the procedures used in its development, even with some exaggerations and distortions, are used here to highlight the unique character of the product.[20]

Changes and continuities in artisanal salt production

The Maras salt is nowadays still produced according to the traditional method based on solar evaporation of seawater arranged through several irrigation shifts on the surface of artisanal pans. The diversification of the marketed products primarily responds to the subsequent treatment to which the finished salt is subjected (its manual selection and cleaning, the grinding, mixing it with other products, and the packaging). However, the intervention of the company responsible for the joint management of the commercialisation of the salt has introduced some significant technical changes in the management of the salt mines.

The classification of three different types of salt has changed and made much more laborious the procedure used in the sweeping. The outermost layer, which is in a cleaner state with whiter grains, is removed to be destined for human consumption and for sale in small pouches directly by Marasal (this is the salt known as *sal extra*). *Sal primera* is extracted from further down in the pond. Its grains, which are a larger, have the characteristic pink colour that today is better valued on the market and sought by companies targeting the domestic market and export. Paradoxically, the company formed by the salt extractors sells this salt in the region in 50kg bags, the content of which will be then sold in bulk to the final consumers. The so-called *sal tercera* ('third class salt') is obtained from the lower level of the pond, where it is to a higher extent in touch with the clay. Its grains are thicker, have a reddish colour and include a greater amount of impurities. It is sold untreated to the livestock- and industrial market. The collection of the finished salt should be carried out without mixing the three types, both during the sweeping and when piling it up in the *era*, so that it can be deposited separately in the warehouses and be paid for according to its quality. This involves a greater workload (twice or more) than that involved in implementing this technical operation in the past.

The management of irrigation water is another important intervention carried out by the company, which has changed the traditional technical procedure. In contrast to the individual responsibility that the extractors formerly had, to cover periodically with a new batch of water the surface of the pans as the successive layers of crystallized salt were forming, nowadays the staff employed by Marasal undertakes this task. The change reduced the old disputes between extractors over access to raw materials and led to a decreased work load as they could limit their journeys to the salt mines to the moments of the sweeping and delivery (a few times a month during the campaign). As opposed to the regulation of irrigation being established at all times by the extractors (to condition the pace of development, according to their own availability and characteristics of their facilities), the intervention of the company has led to a greater standardization of the procedure and, sometimes, a less careful implementation of the operation (Figure 6).

[20] According to the website of Apukachi, for example, '*the Pink Salt of the Andes or Maras Salt is obtained from the natural evaporation of a salty river, which is the drainage of a prehistoric ocean beneath the mountains of Maras in the heart of the Sacred Valley of the Inca*'.

Figure 6. Partial view of the salt mines in the height of the production season (2007).

The above changes, although significant, do not alter the consideration of the procedures used as artisanal. However, some perceive the introduction of new materials as a significant distortion in the traditional character of the Maras salt mines. In this sense, the widespread use of plastic tools (plastic basins instead of the old wicker baskets or *ichiaras*) and iron (metal maces instead of prehispanic *tulkinas* made of wood) is being questioned in the context of tourist use of the salt works and is considered by the company as an issue to be resolved. These substitutions have not affected, however, the *tablilla* used in the sweeping, which is still used by all extractors despite incurring a more demanding work than the tools used in other salt mines. The coverage of the pans with materials of industrial origin tested by some extractors, despite favouring a better cleaning of the salt, is considered as a major threat to keeping the tourist value of the salt.

Conclusions

The addition of the salt mines of Maras to the circuit of mass tourism of Cusco and the growing demand of the salt produced in this Andean district in accordance with traditional methods of solar evaporation are two different manifestations of the ongoing development of heritage consumption. In many intervention projects on ancient sites of artisanal salt production, the landscape and commercial dimensions are the main arguments used to justify their potential in contemporary times. By contrast, the case of Maras is highlighted by the long historical continuity of productive activity and the local technical system still in use today: the physical-chemical principles governing the procedure, the material devices used, the operations implemented and even a substantial part of the social organization of work. In this context, the new demands of global consumption are met by a production complex, which until a few years ago was intended to supply the regional salt market (for food consumption and its various applications, such as chemical) and participate as a complementary activity within a diversified domestic consumption-oriented economy. Thus, the Maras salt mines have a differential value added to the merits mentioned above, which is especially prominent in the framework of the heritage industry: its authenticity.

As part of an unplanned process, the future evolution of these Peruvian salt mines depends on the relationship

between different social and institutional actors, in a context of increasing globalization. Despite its relative fragility, over time and against many circumstances, this traditional Andean industry has abundantly proven its great adaptability. Maras is, therefore, a privileged place for observing the many opportunities offered by traditional salt production for local development in the context of heritage economy.

References

Beisaga, S. 1984. La comercialización de la sal de Maras: problemas y propuesta de soluciones. Cusco.

Beltran, O. 2008. El paisaje de la sal, en el plato. A propósito de las sales gourmet y las salinas tradicionales. *El Alfolí. Noticiario de la Asociación de Amigos de las Salinas de Interior*, 4: 17-23.

Benavente, E. 2006. Proyecto Maras: una experiencia de gestión cultural participativa. In Benavente, E. (ed.) *Casos de gestión cultural en el Perú*: 21-37. Lima, Instituto Nacional de Cultura del Perú.

Bueno, G. 1947. Salina de Maras. In *Revista Universitaria*, 93: 159-165.

Earls, J. 1991. *Ecología y agronomía en los Andes*. La Paz, Hisbol.

Marzal, M. V., Yi, Z. and Goluchowska, K. 2007. Maras: pueblo en camino hacia el desarrollo turístico. *Espacio y Desarrollo*, 19: 81-91.

Montoya, M. P. 2013. *Turismo comunitario y desarrollo rural. Interacción y escalamiento de innovaciones*. Lima, Instituto de Estudios Peruanos.

Orlove, B. S. 1982. Las técnicas tradicionales de la utilización de la sal en la sierra peruana. In Morlon, P., B. Orlove and A. Hibon (eds.) *Tecnologías agrícolas tradicionales en los Andes Centrales: perspectivas para el desarrollo*: 31-34. Lima, COFIDE, PNUD-UNESCO.

Orlove, B.S. 1996. Campos de sal. In Morlon, P. (ed.) *Comprender la agricultura campesina en los Andes Centrales: Perú-Bolivia*: 183-189. Lima, IFEA-CBC.

Palomino, A. 1986. Salineras de Maras: organización y conflicto. *Allpanchis*, 26: 151-183.

SUR. 1978. ¿Cuánto cuesta la sal? El problema de la sal de Maras. *Sur*, 2: 7-9.

SUR. 1982. La sal y las luchas del pueblo de Maras. *Sur*, 46-47: 12-18.

SUR. 1984. Marasal: un pueblo al frente de la administración de sus recursos. *Sur*, 73: 11-15.

SUR. 1986. El pueblo de Maras se moviliza. *Sur*, 95: 37-39.

Van Nierkerk, N. 1990. *La experiencia de Arariwa en el Valle Sagrado*. La Paz.

Salt: a Crucial Feature of Mongolian Nomadism Success

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Abstract

Pastoral nomadism is a multi-millennial culture that is a treasure for mankind to better understand the past, present, and even a sustainable future. It is still a fundamental part of Mongolian economy even though it is critically threatened by cultural and economic changes. Mongolian nomadism is a complex world. Many features, such as pasture areas, water sources, dogs, herd management, and salt are undoubtedly crucial for the survival of animals and nomads and are indispensable for its existence. The abundant availability of salt certainly allowed the spread of nomadic pastoralism in Mongolia in prehistoric times. In 2002 the Italian Association for Ethnoarchaeology, with the financial support of the Ministry of Foreign Affairs and in collaboration with Professor Dulam of the National University of Ulaanbaataar, began an ethnoarchaeological project concerning nomadic camps in different regions. Since 2009 the project has focused especially on winter and spring camps in the Mogod region (Bulgan aimag). The cold season's camps are usually fixed camps, frequently located in the mountains, and can be owned by one family who returns every year to the same camp; therefore, their study is also very important in an archaeological perspective. The ethnoarchaeological project documented locations of routes, camps, and resources in the Mogod area. The data relating to the salt supply and its use for animals is important for a better understanding of the salt world and even the economic dynamics of Mongolian nomadism, both past and present. The pasture locations are dependent on a safe, secure, and abundant salt supply. In summer and autumn, when the camps are located in the valleys, livestock can usually obtain salt by drinking directly from the nearby salty lakes or by eating the grass that grows around salty places. But for the winter and spring months, nomads usually create salt-licks by carrying the salt to the camps at the beginning of each season. It is also important to remember that, from the fifteenth century, Mongolia has been crossed by caravans of Russian Kazakh and Mongolian / Chinese traders who also carried salt from the west to the east. This 'salt road' was interrupted in the 1920s as an aftereffect of the communist revolution. Some nomads still remember the salt road and its importance.

Keywords: Nomadism, salt, Mongolia.

Introduction

With an average altitude of 1580m, Mongolia is one of the highest countries in the world. It is far from the mitigating influence of seas and oceans, therefore its climate is strictly continental, with a long and cold winter season and a short summer of around one hundred days. In Mongolia, temperatures range from between -40°C in winter and up to +40°C in summer, and precipitation is never abundant. Nevertheless, thanks to various propitious features, life is possible for both nomads and their livestock. Nutritious pasture areas, water sources, and salt availability are undoubtedly crucial for the survival of nomads and their animals.

Mongolian nomadism is a multi-millennial culture that is a treasure for mankind when helping us to better understand the past, present, and even a sustainable future. Nomadism is still a fundamental part of the Mongolian economy, even though it is critically threatened by cultural and economic changes.

In 2002 The Italian Association for Ethnoarchaeology, with the financial support of the Ministry of Foreign Affairs and in collaboration with Professor Dulam of the National University of Ulaanbaatar, began an ethnoarchaeological project focused on nomadic camps in different regions. The main goal of the project has been to document roaming locations, camps, and natural resources, in addition to tangible and intangible cultural elements, all in order to better understand the past, present and future of Mongolian nomadism.

In fact, even if it is indubitable that Mongolian nomadism has changed during the centuries and that it is still rapidly changing, it still has traits and features in common with the nomadic lifestyle of the past (Lugli 2008, 2011, 2013, 2014, 2016). Therefore, to study current nomadism it is essential to know of past nomadism.

Since 2009 the project has been concerned with winter and spring camps. In fact, cold season camps are crucial from an ethno-archaeological perspective because winter camps are usually fixed, frequently located in the mountains and used by the same family year by year. The research has been especially focused on the territory of Mogod (Bulgan *aimag*) and its surroundings.

It immediately became apparent that the data relating to salt and its use are critical to a better understanding of steppe nomadism. In fact, the abundant availability

of salt allowed the spread of nomadism in Mongolia in prehistoric times.

From the fifteenth century Mongolia has been crossed by caravans of Russian Kazakh and Mongolian / Chinese traders, who also carried salt from the west to the east. Przhevalsky (1876: 210) reported that the salt from the Tabasun-nuur lake was taken to the neighboring provinces of China. The salt trade was interrupted in the 1920s as an aftereffect of the communist revolution. Some nomads still remember the salt road and its importance.

Mongolian salt availability

In Mongolia (1.566.000 km^2) there are numerous natural salt pans, outcrops and lakes (Figure 1a-1b) that are strongly influenced by the harsh continental climate of the Central Asian steppe.

*Figure 1. a) Salty lake near Bogd district (*Övörkhangai*); b) Salty place near Shar Hundiin (Bajanhongor) (Photo Capitini 2006).*

As Egorov (1993: 14) has stressed, salinity is present in more than 80 percent of the 3500 Mongolian lakes (15,600 km^2), and saline rich water has a volume of roughly 30km^3, which is three times that of Mongolian freshwater lakes. Salty lakes vary from very small to extremely large and are irregularly distributed: 34 percent of salty lakes are in the Altai and Khangai-Khenti regions and 66 percent in plain-steppe desert regions (Egorov 1993: 14), but about 36.5 percent are located in the Govi area. In the Govi and in the east steppe lakes, water is more saline than in wetter regions. An increase in salinity usually corresponds to a decrease in elevation, however, humidity is also important, causing the lakes in the Mongolian Altai region to be slightly saline, while in Govi and in arid regions the water has more salinity.

Seasonal changes can also vary salinity. In fact, seasonal and long-term salinity fluctuations reflect the continental climate of Mongolia (Egorov 1993: 17).

Mongolia is also rich in rock salt, but nomads usually use the salty surfaces of the land or near salty lakes or for their livestock and buy rock salt for human use.

Salt availability is certainly a treasure for Mongolia, its shepherds, and its livestock. It is renowned that wild and domestic animals need salt for their development and existence. Salt is indispensable for the maintenance of fat, bones, teeth, muscles and the circulatory, nervous and gastrointestinal systems, in addition to maintaining a balance of blood acid levels, for milk production and for treating skin and eye infections in animals. During winter and spring, pastures can be scarce and less nutritional. In these seasons it is very important to provide animals with salt to stimulate appetite and thirst every day. Salt is also used to treat animals, and, for example, it is recommended in the case of animals buried for a long period of time under snow (McPhee 2002: 11).

It can be easily assumed that without available salt, the nomadic lifestyle on the Mongolian steppe would have been impossible.

Mongolian livestock and salt

Mongolian nomads move several times during the year, depending on the region, in order to have a supply of water, food, and salt. Nomads generally spend cold

Figure 2. Nomads usually spend cold months in a permanent camp, usually located in the mountains which is well sheltered from the cold prevailing winds (Mogod – Bulgan) (Photo Lugli – Mogod 2010).

Figure 3. Summer camps near a salty lake (Övörkhangai) (Photo Capitini 2006).

months in a permanent camp, usually located in the mountains (Figure 2), which is well sheltered from the cold prevailing winds. During the warm months nomads usually use temporary camps in the valleys, close to water sources, and they can move several times, depending on water, pasture and salt availability (Figure 3) (Lugli 2011: 210).

For the well-being of the livestock and efficient exploitation of natural resources, a balance is required between seasonal pasture, number and type of animals, water supply, and salt availability. Therefore, Mongolian camp locations are dependent on safe and abundant resources.

In summer and autumn, when the camps are located in the valleys, livestock can usually obtain salt by drinking directly from the nearby salty lakes or by eating the salty grass which grows around salty lakes or salty places. But for the winter and spring months, nomads usually create salt-licks by carrying the salt to the camps at the beginning of each season. Animals can usually lick the salt marsh that nomads leave in their pen, or salt can be added to the food or to warm water. Salt is also mixed with milk to feed baby animals.

During the harsh cold season, nomads usually store salt, in a small ger (yurta) or a wooden structure.

Figure 4. The map of Mongolia with its aimag. *The black arrow indicates the Mogod district.*

Many interviews have been made over the years in Mongolia and in the Tuva Republic. Since 2009 the research has been focused on the Mogod area (Figure 4) and the surrounding territories, where more than 100 interviews were conducted to investigate how and if salt availability is important for the choice of a camp.

Mogod is a district of the northern region of Bulgan. It is characterized by steppe, rivers, valleys and mountains that have been exploited since ancient times. Mogod is famous for its *airag* and does not have yak breeding. From an ethnoarchaeological point of view, the territory is especially interesting for its traditional mountain winter camps, which have been in use for generations, and for its archaeological remains.

Nomads move four to five times a year according to the seasons, but they do not travel long distances. The camps are usually in a range of no more than 10-12km.

Mogod is currently well connected to Ulaanbaatar and to Bulgan but the route was hard in winter until a few years ago.

On the basis of the Mogod interviews, it can largely be assumed that in this area:

- An easily accessible salt supply (max 4-5km) is indispensable for summer and autumn camps, useful for spring camps but not for winter camps (100 percent)
- Salt availability is usually a maximum of 15-18km from camps, both winter/spring camps and summer/autumn camps
- Nomads (99 percent) say that they stock salt for the cold months. In one case, nomads collect salt and snow every two weeks (2000kg for 250 goats, 1200 sheep, 95 bovines and 90 horses – Camp 2009/68). Only one family (1 percent) has winter camps near salty water or salty places, and their animals can eat or drink salty water or eat salty grass whenever they want.
- Nomads (100 percent) never stock salt for warm months. The camps are not far from the salty lake, and animals can take it directly and freely by drinking salty water or eating salty grass.
- Salt is taken from the salty sand of a river or of a lake for cold months (98 percent).
- Salt rock can be bought (2 percent) for cold months in Erdenet or in Ulaanbaatar and it usually comes from China. In camp 2014/149 nomads usually buy: 200kg for 200 goats, 800 sheep, 20 yaks, 100 bovines, 30 horses, and in the camp 2014/81: 500kg (but for winter and also spring) for 250 goats, 800 sheep, 50 yaks, 70 bovines, 30 horses.
- Stocked salt amounts in winter camps vary from 250-300kg (Camp 2011/39: for 170 goats, 320 sheep, 25 bovines and 50 horses up to 2000kg), (Camp 2009/68: 250 goats, 1200 sheep, 95 bovines and 90 horses).
  The amount varies on the basis of how many animals a family has (especially bovines, goats and sheep) and on the quality of salt. Therefore, it is not easy to have mathematical certitude about the amount of salt use.
- 100 percent of nomads said that they do not take salt from the sediment in the mountains but always from salty valleys and salty lakes;
- Nomads usually buy salt for humans. Only one time was the use of collected salt documented to make tea.
- Mongolian nomads remember a salt trade but it is not currently in use. Chinese salt that is bought in the cities is rock salt.
  In the Tuva Republic sometimes nomads sell the salt that they collect.

Conclusions

Ethnographic data is indispensable when attempting to reach an exhaustive knowledge of the process that permitted nomadism to become the lifestyle of the steppe populations.

For example, in the case of the Mogod territory, it is well documented that camps (especially warm month camps) must always be in an area where salty lakes exist and where salt is easily available for livestock. The life of nomads is completely dependent on salt availability, and camps are never further than 15-18km from salt. If salt is collected and stocked for cold months, it must be easily accessible during warm months when animals can directly take it by drinking salty water and eating salty grass.

Therefore, roaming is always organized on the basis of pasture, water, and salt resources.

Nomads remember a salt trade for human necessities in the cities, and in the Tuvinian steppe it is still documented. But the salt trade is not documented for the nomads' livestock and it can be assumed that this is not a recent economic model. So, it can also be used to understand ancient roaming and the use of the land.

From an archaeological perspective, it is also important to note that nomads stock salt in their larders and that they give salt to their animals in the pens, with water or with food, during winter. Therefore, salt traces could be found in case of an archaeological excavation of a winter camp.

Salt availability has been crucial in Mongolian steppe nomadism and ethnographic data can also help to study nomadism in ancient times.

References

Egorov, A. N. 1993. Mongolian salt lakes: some features of thgeir geography, thermal patterns, chemistry and biology. In S. H. Hurlbert (ed.) *Hydrobiologia*: 13-21. Kluwer Academic Publishers.

Lugli, F. 2008. The nomadic camps of Mid-West Mongolia: the case of the spring site of HulhinShilin (IhTamir). In F. Lugli and A. A. Stoppiello (eds.) *Proceedings of the 3rd Italian Congress of Ethnoarchaeology*, Rome 17-19 March 2004: 135-145. Oxford, British Archaeological Reports International Series 1841.

Lugli, F. 2011. The nomadic camps of the Middle Gobi Region. The case of SharUdag site (LussDundgov) and of Buleenher site (DelgerhangaiDundgov). In F. Lugli, A. A. Stoppiello e S. Biagetti (eds.), *Proceedings of the 4rd Italian Congress of Ethnoarchaeology*, Rome 17-19 May 2006: 194-206. Oxford, British Archaeological Reports International Series 2235.

Lugli, F. 2013. Winter camps in Mongolia. In F. Lugli, A.A. Stoppiello e S. Biagetti (eds.) *Proceedings of the 5rd Italian Congress of Ethnoarchaeology*, Rome 13-14 May 2010: 209-216. Oxford, British Archaeological Reports International Series 2472.

Lugli, F. 2014. Nomads and dogs: a crucial bond. In *Proceedings of Урал-Алтай: через века в будущее (Gorno Altaisk 2nd-5th of July 2014)*: 19-21, Gorno Altaisk.

Lugli, F. 2016. Mongolian nomads and their dogs. In S. Biagetti and F. Lugli (eds.) *The Intangible Elements in Ethnoarchaeological Research*: 125-139, Springer International Publishing.

McPhee, C. 2002. *Herding Knowledge*, ADRA Mongolia.

Przhevalsky, N. 1876. *Mongolia, The Tangut Country, and the Solitudes of Northern Tibet being a Narrative of Three Years' Travel in Eastern High Asia,* London: Sampson Law, Marston, Searle & Rivington.

The Role of the Oasis of Selima (Sudan) in the Long Distance Trade of Salty Rocks in the Sudanese Western Desert in the 19th and 20th Centuries

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Abstract

Selima is an oasis located in the Sudanese Western Desert 120km from the Nile Valley, at the latitude of Sai Island, and 70km south of the Egyptian-Sudanese border. Until the end of the 20th century, nomads crossed the desert along the Darb al-Arbain, the Forty Days Road, to Darfur for natron. Selima was one of the best stops of the journey. This oasis was the goal of the caravans of salt coming from Dal (Northern Sudan). The aim of this article is to present the first results of an ethnographic study among the nomads who participated in the last salt and natron caravans to Selima.

Keywords: Sudan, Egypt, Selima Oasis, Salt, Western Desert, Long distance trade.

Introduction

Selima is an oasis located in the Sudanese Western Desert 120km from the Nile Valley, at the latitude of Sai Island, and 70km south of the Egyptian-Sudanese border (Figure 1). It was a stop in the network of sand tracks through the Western Desert in Egypt and Sudan, particularly because of the presence of water. This oasis was a stopping place for the nomads who roamed the *Darb al-Arbain*, the Forty Days Road[1] (Asher 1993: 104) that connected Assiut, a town in the Nile Valley in Egypt, to Koubayh, a town in Darfur (Sudan) today nonexistent, but remained for a long time the starting point for the annual caravan composed of hundreds of slaves and precious goods.[2] It was also a place for trade between the Nile Valley and Libya.

This site was occupied or used between prehistory to the present day and has been described by many ancient travelers and foreign explorers who stopped there.[3] If these contributions reveal very interesting information, no comprehensive study, archaeological, anthropological and geographical, had been conducted there. Given the importance of this oasis in the network of trails of the western desert, it seemed to us essential to begin a survey and excavations. The Selima Oasis Project[4] is deliberately done by a multidisciplinary team. The presence of pre-historians, archaeologists, historians and geographers aims to better understand the occupation of the oasis during the Holocene.

These investigations are part of a larger project on the movement of goods and people in East Africa during the Holocene and the place of the oases in ancient and modern economy. The objectives are multiple:

- Identify the different possible routes of exchanges running North and South and also East and West and their periods of operation,
- Identify traded products and their recipients (Egypt, Mediterranean world, Garamantes, sub-Saharan Africa, Axum and via the Red Sea Arabia and India)
- In the case of trade with the Mediterranean Basin, understand if the contacts are always made by the Nilotic route via Egypt or if there were other lines of traffic (Red Sea, trans-Saharan trails via the Garamantes, etc.)
- Finally, identify the peripheral populations and thus the potential commercial intermediaries and seek to identify the information gathered from the boundaries of different states (kingdom, principality, etc.) taking part in these exchanges.

[1] « Pharaons noirs. Sur la piste des quarante jours », Exhibition organized from March 9th till September 2nd, 2007 by the royal museum of Mariemont (Belgium; curator of the exhibition: Marie-Cécile Bruwier).

[2] Tusks, skins of hippopotamuses, horns of rhinoceros, feathers of ostriches, ebony, arabic gum ...

[3] 1698, C. Poncet ; 1700, Th, Krump ; 1704, J. J. Lenoir de Roule; 1793 et 1796, W. G. Browne ; 1822, Fr. Cailliaud; 1903, Hadgson; 1903 et 1925, T. A. Leach; 1927 et 193, D. Newbold & W. B. K. Shaw ; 1929, 1930 et 1939, L. E. Almasy ; 1931, U. Monneret de Villard ; 1930 et 1932, R. A. Bagnold ; 1933, H. Rhobert.

[4] This multidisciplinary research project is managed by Dr. Coralie Gradel, former researcher at the French Section of the Department of Antiquities of Sudan (2010-2014). Begun in 2011, Coralie Gradel was rewarded by the Price of the Foundation Shiff Giorgini in 2012. From the beginning, the Selima Oasis Project has been a German-French cooperation in close collaboration with Sudan's National Corporation for Antiquities and Museums (NCAM).

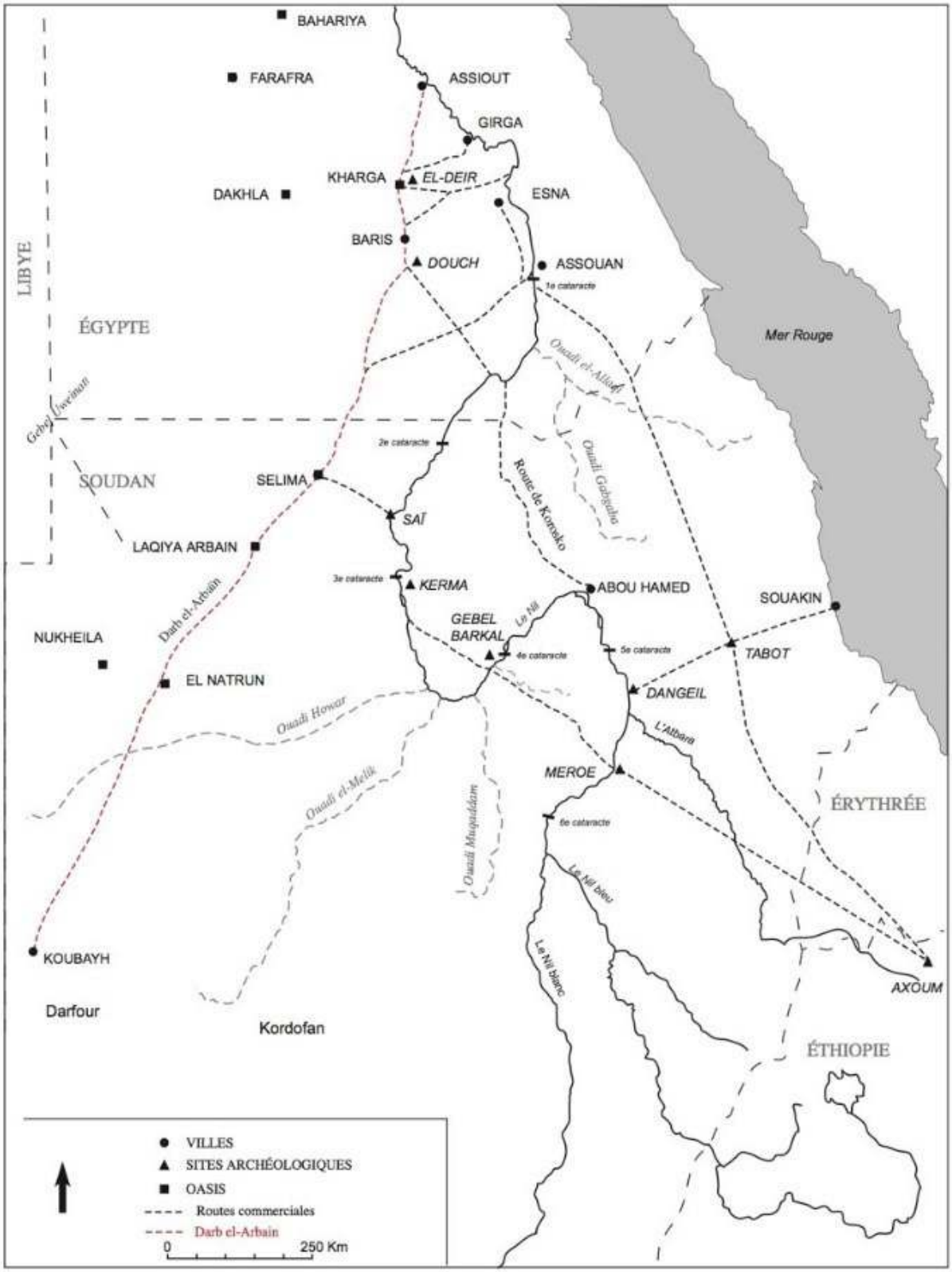

Figure 1. The network of roads of Western and Eastern deserts in Egypt and Sudan © Coralie Gradel (July 2014).

Ultimately, our intention is to understand the place of the Nubian kingdoms (Meroe, post-Meroitic, Christian) and Egypt in the network of caravan routes of the western and eastern deserts and long-distance trade. We also want to understand the nature of the desert in those days: a transit territory or a contact area and an economic interface? We wonder especially about the role of oasis agricultural areas, urban and commercial, and the possible existence of a typical oasis economy in these regions. Finally, we wish to draw a new map of the distribution of archaeological remains and the network of caravan routes used from antiquity to the present.

The authors conducted three field missions in the oasis of Selima. The first, in November 2011, allowed mapping of the oasis and identification of several archaeological sites in Selima. The portion of the track between Selima and the oasis of Laqiyat Arbain located 200km to the southwest was also surveyed. Many archaeological sites were recorded. The aim of the second and the third missions, in November 2013 and October 2014, was to excavate two sites identified two years earlier, namely a Neolithic site and the building now known as Beit al-Selima. The latter was described by many travelers. Different hypotheses have been proposed about the supposed function of this structure: monastery, convent, hostel, or any other function, perhaps in connection with the trans-Saharan trade.

This article aims to present the results of an ethnographic study among nomads of Egypt and Sudan who participated in the last caravans to Selima.

The exploitation of salt in Selima

Apart from the presence of water and dates in Selima, literature mentions the exploitation of rock salt by Egyptian and Sudanese nomads (Leach et al. 1926: 42). Since we wonder about the potential of this oasis, we were also interested in caravans that came for the salt at Selima.

One goal of the Selima Oasis Project was to locate deposits of rock salt, identify the nature of these salty rocks and meet the participants of the last salt caravans in northern Sudan.

In 2011, at first we spotted in the middle of the oasis of Selima holes about one-meter-deep whose edges were covered with a white powder strongly resembling table salt (Figure 2 and 3). In 2011 and 2013, we also found a few kilometers west of the oasis deposits of rock salt, but this time in a very hard crystalline form (Figure 4). Analysis of the samples revealed that it is halite, i.e. sodium chloride.[5]

Figure 2. Salt in Selima © Franck Derrien.

Figure 3. Salt in Selima © Franck Derrien.

Figure 4. Salt in Selima © Franck Derrien.

[5] Thanks to Ivana Angelini (University of Padova, Italy) who performed gracefully the chemical analyses.

Figure 5. Interview with Tolodi in Dal © Coralie Gradel (October 2014).

According to the literature, the caravans were from Sukkot, the Mahass and Argo, three northern regions of Sudan.[6] So we started an ethnographic study to try to locate and identify the last caravan. We found some of them in the Dal area, on the western shore of the eponymous cataract, near the border with Egypt.

The Dal area is inhabited by members of the Sukkot tribe composed mostly of farmers living on the banks of the Nile. This is the case of Tolodi (Figure 5), a Nubian farmer who grew wheat, barley, lentils and harvested dates. Neither his grandfather nor his father travelled to Selima. Other residents of the region do not belong to the Sukkot tribe. They present themselves as *'Arab*. This is the case for example of Youssef Muhammad who lives a few kilometers south of Dal. He belongs to the tribe of Gararich. Formerly he grew date palms and then sold them. Like his father and his grandfather before him, he was the *khabbir*, i.e the guide of the salt caravan to Selima. He was not paid for this services. He was only paid by the salt he found there.

The nomads went to Selima once or twice a year, in winter, between October and January. Until the early 1980s, Yousef Muhammad was the owner of two or three camels. If it was not enough to go to Selima, he rented others from his neighbors. According to the testimonies, caravans never exceeded 10 men, on average 4-9. The number of camels was also very small, typically 3, a maximum of 5, according to our informants. The Nubian Tolodi had no camel. He rented from members of his family, against remuneration, i.e. half the salt from Selima for the owner of the camel.

There is no well between the Nile Valley and the oasis of Selima. Camels found neither water nor food on the way to Selima. From Dal, the men carried with them water, food and wood. Each camel carried two *guirba*, i.e. wineskins in goat skin, water from the latter being reserved for the men. Caravanners fulfilled their *guirba* of Nile water between Dal and Selima. They drank water from Selima in the eponymous oasis and during the journey towards Dal. Along their route, some caravanners deposited food reserves in anticipation of the return, on the tops of some hills that mark a portion of the route or at the basis of these gebel. The men took tea, sugar, wheat flour to make bread, the *wekka* (powdered okra), tomato sauce, lentils and dates.

According to evidence, all the Sukkot Nubian tribesmen were unaware of the exact route in the desert to go to Selima. None of them would have dared to go there without a guide. The guides all belonged to the *'Arab* installed along the Nile in northern Sudan. Caravanners needed three days to reach the oasis of Selima from the Nile Valley. Camels were attached in single file, ridden by caravanners. Initially, they walked along the Nile in the southern direction until the island of Arnata. Then, they moved across the Sudanese western desert to the oasis of Selima, heading northwest. Caravanners were led by the stars at night and day by *alamat*, these famous stones so characteristic of desert landscapes which indicate the roads to follow. The aim of the caravan was to join Selima as quickly as possible. Men and beasts thus slept very little. If the weather was very cold, the men sheltered at the base of a gebel. Otherwise, they laid anywhere.

Between Arnata and Selima, the route is marked by some hills. The Gebel al-Noss, literally 'the mountain of the half way', is the last elevation of the route and led the caravan to a sandy plain that descends gradually toward the oasis. As soon as they saw the date palms of the oasis, they walked to the well, and after a nap, quickly went to work to clear the first blocks of salt. All witnesses from Dal agree on one point: salt deposits run by caravanners were northeast of the oasis, a 5-10 minutes walk, just behind the gebel Tulia, while those we located are 3.5km to the west. The place indicated by the nomads is covered with sand. A new survey is needed to locate exactly the deposit. The caravan began by removing the sand, and then broke the salt blocks. The large salt blocks were broken down on site, but not into powder. Some caravans camped in the shade of date palms, not far from the well, at about 20m. Others slept on the sand between the oasis and the salt deposit. While the men worked and slept, camels remained in the oases and grazed halfa, a leg tied so they did not run away.

All testimonies also agree on the following point: the oasis of Selima was empty of a settled population. Our contacts only crossed that Sudanese nomads coming to seek salt to Selima or nomads returning from Bir Natrun. They confirm the presence in the palm grove

[6] Sukkot is the region situated in the North of the gebel Dosha. In the South of this mountain is Mahass which goes to the cataract of Khandak. Argo is an island situated at the level of Kerma.

of *rakuba*, i.e. small huts in good condition at the time According to them, they were occupied during the date season. At no time did the people we interviewed mention huts next to Beit al-Selima. This suggests that these structures whose surfaces are strewn with salt, dates and doum palm (also named gingerbread tree, *Hyphaene thebaica)*, are older than what we thought. The excavation of these structures and the dating of the remains to be uncovered may allow us to learn more.

Figure 6. Natron in Selima © Franck Derrien.

The caravanners did not stay a long time in Selima, between 3 and 10 days according to the testimonies. They were afraid of being attacked by robbers. After harvest, the camels wore kantars two on each side, i.e. 50kg on each side for a total of 100kg. The camels were loaded with salt and men walked alongside. The caravanners sold their salt first to the people of Dal. Some foreign buyers came to Dal. It also happened that caravans were going to sell their salt outside the village. For example, Muhammad Saleh Suleiman was selling his salt to Akasha, a village on the bank of the Nile. At that time, the salt of the villagers came exclusively from the oasis of Selima. According to the first results of this survey, the oral tradition relates that the last salt caravans from Dal to Selima took place in 1980.

The role of the Selima oasis in the trans-Saharan trade of natron

The caravanners of Dal only sold salt. When they were in Selima, they all nevertheless came back with natron (Fig.6), but exclusively for family use, especially medicinal to treat stomach ache or ear infections, for example, but also culinary, to prepare the *molokheya*.[7]

If Selima was the final destination of the salt caravans from Dal, this oasis was a long awaited step of natron caravans coming from Kharga to Bir Natrun.

Natron is a natural mixture of sodium salts that had been used in Egypt, the Middle East and Greece since ancient times for different purposes: medicine, food, agriculture, glass making, mummies drying (Josset 1996: 385). That of Bir Natrun, very white and strong (Browne 2002: 177), was used to bleach fabrics and do the laundry (Cuny 1854: 83), clean the skins, hides and gourds (Walz 1978: 6), or make soap and snuff (Asher 1993: 105). In the 19th century, most of the natron transported to the Nile Valley was used in preparing the powdered tobacco. Since the 18th century, the natron is still being widely used in veterinary medicine in Darfur. Breeders always mix a large amount in the water they give to their camels, horses, donkeys, sheep, convinced that it whets the appetite of animals and that this method helps to fatten them.

According to our informants, from all the nomadic tribes of Egypt, the Rachaida of the Egyptian Western Desert, the Chararat and the 'Awazim of Kharga were the only ones who moved to Bir Natrun in order to extract natron. In this ethnographic study, we met some of the guides belonging to this tribe native to the Arabian Peninsula. The Rachaida, who live nowadays in Sudan and in Egypt, consider themselves to be descendants of Bani Rachid from the Hijaz, the Najd, Mecca and Medina in Saudi Arabia (Hassan 1975). Many Rachaida crossed the Red Sea and settled in Sudan and Egypt in the second half of the 19th century. Some Rachaida settled in the oasis of Kharga, the southernmost permanently inhabited oasis of the Egyptian Western Desert. In 1976, the Rachaida said their tribe had organized natron caravans between Kharga and Bir Natrun for three generations (Khoury-Wagner and Décobert 1981: 333), namely a period of 80-90 years. According to this testimony, they had been present in the region since the late 19th century. The information we collected goes more or less in this direction, but further study is needed. For example, we discovered that a man from the Rachaida carefully wrote down genealogical information for many years. The confrontation of the bibliography, testimonies and information from the private archives will certainly contribute to refining the chronology and history of the arrival of the Rachaida in the oasis in the Egyptian western desert and thus trans-Saharan trade of natron.

Their trip began in Paris, a hamlet south of Kharga Oasis. The Rachaida then headed to the Gebel Abu Bayan and Waguif (Figure 7). After three days of walking, the caravan reached Bir Murr. Between the well and Bir Abu al-Hussein, there was between one and two and a half days, according to these testimonies, and the journey took six hours between Bir Abu Hussein and Bir al-

[7] Okra, bamyah.

Figure 7. Hassan Salem Messaoud tracing the route between Kharga and Bir Natrun © Franck Derrien (January 2013).

Kiseiba. Nomads reached Bir Kurayim in 7 hours or half a day. On some sections, the caravan followed different routes. Hassan S.M. joined Selima in 3 days by Bir Kurayim. Ahmed G.M.G. followed an alternative route, with an additional step in Bir Dibis. Four days of walking separated Bir Kurayim to Bir Dibis, and 3 additional days were needed to reach Selima. Selima and Laqiya Arbain are 5 days walking distance. The camel needed six days to join al-Mahatan. Hassan S.M. then joined Bir Natrun in 7 hours walking. Ahmed G.M.G. joined Nakhl in 8 hours and finally Bir Natrun after a day and a half of extra walking.

Camels and men could quench their thirst at Bir Murr, Bir Abu al-Hussein and Bir al-Kiseiba. The quality and availability of water were highly variable. The water of Bir Murr was very salty.[8] The water of Bir Abu al-Hussein was good but available in small quantities. Finally, the water of Bir Kiseiba was good and plentiful. According to Ahmed G.M.G., there was no feed for camels at the aforementioned steps, unlike the oasis of Mahatan, al-Shab, Selima and Laqiya Arbain where there was halfa. The water of Bir Dibis was good, plentiful and available by digging 70cm deep. The water of Selima was great and inexhaustible. The analysis carried out in 2011 confirmed the potability of the water. It is available all year round to 70cm deep. Sudanese soldiers drank it every day in 2014.

The Rachaida traveled from sunrise to sunset, at least a dozen hours. When it was too hot, they traveled at night, especially when there was a full moon. They moved with the stars. The caravan traveled twenty days along the thousand kilometer route between Kharga and the natron exploitation site in Darfur. With the three or four days of work and stop in the oasis of Selima when the nomads came back from Bir Natrun, the total duration of this trip was about a month and a half.

Young Rachaida tribesmen first joined the caravan when they were around 16 or17 years old, often with some of the other men from their family, such as their father, an uncle, a cousin. The number of people in the caravan was variable, but generally ranged between 5 and 20 men. They never moved together; they traveled in small groups of about five people. They regrouped themselves by affinity. Each group was separated by about 1km. The number of camels for which a man was responsible was also variable, between 5 and 20.

On departure day, each camel was in charge of about 150kg of food. Every evening the animals ate 3kg of cereal. The nomads buried an equal quantity in strategic locations for the return. They also left dead wood. This process freed up space in the bags, meaning there was much less weight to be carried by the animals to complete the journey and more place for natron on the way back.

Men ate lentils, pasta, rice, and bread. They took wood to each oasis to make fire. Men outweighed their water in a *guirba*; Hassan owned 5 or 6. During the journey, some of the water evaporated and though this natural process kept relatively fresh water, the losses were sometimes large. In addition, a *guirba* that felt to the ground was torn. Some caravanners preferred jerrycans, which were less fragile and more convenient. The water was renewed and filled up whenever possible.

The objective of this trip was the natron extracted from the eponymous oasis. Bir Natrun was also known as the Wadi Natrun, Bir al-Malha and Bir Zaghawa. The site has a total of four wells, the other three are Bir Sultan, Bir Nakhla and Bir Milani. The Kababish and Howawir knew the place as al-Atrun. In the early 20th century, the natron was operated 2 miles west of gebel Kachafa. Bir Natrun was visited by several Sudanese tribes, such as the Zaghawa, the Kababish, the Bideyat and Gura'an but also by tribes from Egypt, like Rachaida, the Bili 'Awazma and Mugariba.

Once in Bir Natrun, men began by clearing the sand that covered the natron. The nomads worked three to four days. A young camel carried up to 150kg. An older and powerful camel could be loaded with up to 200kg. According to Hassan, each camel was therefore returning with two bags of 80-100kg of natron each.

[8] Assouan, Survey of Egypt (1/500 000), 1944.

On the way back, men and animals ate what they left in the rocks. The caravan parked one to a few days in the oasis of Selima. Camels took the opportunity to drink, eat and rest in the halfa. They walked away toward Baghdad and Khartoum, two southern villages of the oasis of Kharga, where families lived for most caravanners of Chararat and 'Awazim.

Once back in the oasis of Kharga, natron was discharged. The men were granted a break of twenty days. The nomads then travelled by camel to the Nile Valley to negotiate the price of natron. Once they fixed a price, they returned with the rock extracted from Bir Natrun.

In the last quarter of the 20th century, the natron was sold in the area of Assiut and Esna. Hassan got 5 Egyptian pounds per kilo. A caravan with 10 camels brought out an average of two tons of natron every time. This trade was very lucrative, and it is undoubtedly for this reason, as before, that most caravans travelled to Darfur to collect salty rocks to sell in Egypt. Prices were relatively high in Assiut. The Rachaida of Kharga travelled twice a year, one at the beginning of winter and the other at the end. Archives, traveler stories and scientific articles confirm the existence of natron caravans at least until late 1970. According to several accounts, the last natron caravan between Kharga and Bir Natrun through Selima took place in 1990.

Conclusion

In 2011 and 2013, the team of the Selima Oasis Project surveyed the eponymous oasis and the southern part of the Darb al-Arbain between Selima and Laqiya Arbain and found many previously unpublished archaeological sites. In 2013 and 2014, the team excavated 2 prehistoric sites and the building known as *Beit al-Selima*. The ethnographic study enabled us to answer many of our questions, such as the geographical and ethnic backgrounds of members of salt and natron caravans that have persisted until the end of the last century. We also specified routes, travel arrangements in the desert and the salty rock extraction techniques to Selima. The role of the Selima oasis in the trans-Saharan trade of salt and natron gradually become more accurate. Ultimately, it will be possible to establish a map of the space-time occupation of the oasis of Selima by nomads. This study confirmed the total absence of a sedentary population in Selima.

It also contrasts the large annual caravans from the 17th and 19th centuries composed of thousands of men and camels from Darfur to Egypt with the small salt caravans composed of only a few men accompanied each by three or four camels.

The presence of good water available throughout the year, dates and salty rocks make it a destination and a stop in the network of tracks of the Sudanese western desert and the trans-Saharan trade, legal or not. Before the army invested in this place ten years ago, this oasis was a point of a route used by smugglers towards Libya, with migrants for example.

Finally, the testimonies show that most of the salt caravans were held in winter. All this is to be related to the fact that in ancient times, before the introduction of the camel in Sudan, nomadic traveling in the desert used donkeys, who are less resistant to heat and thirst as the camel. Based on this information, one may wonder if the oasis of Selima was not occupied only intermittently and if the 'house of Selima' was not a place of storage and exchange control. The continuation of our research will allow us hopefully to answer this question.

Acknowledgements

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References

Asher, M. 1993. *La piste des quarante jours*. Payot.

Cuny, C. 1854. Notice sur le Dar-Four et sur les caravanes qui se rendent de ce pays en Egypte, et vice versa. In *Bulletin de la Société de Géographie, 4 sér., Tom VIII*: 81-120.

Hassan, Y. F. 1975. Hijrat al-Rashayda ila al-Sudan (The Migration of the Rashaida to the Sudan). In Hassan Y. F. (éd.), *Dirasat fi ta'rikh al-Sudan (Studies in the History of Sudan)*: 173-200. Khartoum, Khartoum University Press.

Josset, P. 1996. Emplois thérapeutiques du natron dans l'Egypte antique et le monde gréco-romain. In *Revue d'histoire de la pharmacie*, 84e année, 311: 385-396.

Khoury-Wagner, J. and Décobert, C. 1981. Caravanes de natron sur le Darb al-Arba'in. In *Annales Islamologiques* 17: 333-342.

Leach, T., A., Grabham, G., W. and Addison F. 1926. The Selima oasis. In *Sudan Notes and Records* IX, 2: 37-49.

Naoum C., B., 1903. *Géographie du Soudan*. Bibliothèque Peirsec 26. Paris, L'Harmattan.

Sauberon S. 1969. Les neuvièmes et dixièmes campagnes archéologiques à Esna (mars-avril 1967 et mars avril 1968). In *Le Bulletin de l'Institut français d'archéologie orientale* 67: 87-116.

Shaw W., B., K. 1929. Darb el Arbain - The Forty Days' Road. In *Sudan Notes and Records* 13: 63-71.

Young W.,C. 1996. *The Rashaayda Bedouin. Arab pastoralists of Eastern Sudan*. Georgia Southern University.

Walz T. 1978. *Trade between Egypt and Bilad As-Sudan 1700-1820*. In *Textes arabes et études islamiques* VIII, Institut français d'archéologie orientale.

Usage of Salt in Therapy and as a Magical Cure among Mongolian Ethnic Groups

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Abstract

In mythology, Salt Mountain, located in Torkhilog bag, Davst soum, Uvs province in a remote western edge of Mongolia (Figure 1), was originated by an old man and woman who were keeping their treasures with salt in sacks underground while waiting for their son to return from war. The salt was melted by the sunshine, rain and humidity and became a salty hill. Salt Lake, situated in remote eastern Dornod province, was said to have been originated by the creation of To wang or Togtokhtör, a wise man, who brought salt from China and planted it on a hollow place. The usage of salt is quite different among Mongolian ethnic groups. People of Dornod steppe do not use salt in their teas but apply much to their food, whereas western Mongolians do not use salt in their food but much in their teas. The Torguud people among western Mongolians use the salt liberally, while the Ööled people use it sparingly, which may have been caused by the distance of salt mining. Because of this, Torguud people say that 'we are not Ööled, not sick and will use salt affluently' and Ööled people say that 'we are not Torguud, not a camel and will use salt scarcely.' Salt therapies are applied to bone fractures, joint pain, hypothermia, and gastric diseases. Salt is believed to be a magical cure by many Mongolian ethnic groups, such as for crying infants, to extract truth, and to find lost things, among other functions.

Keywords: Usage, therapy, medical cure of salt, Mongolia.

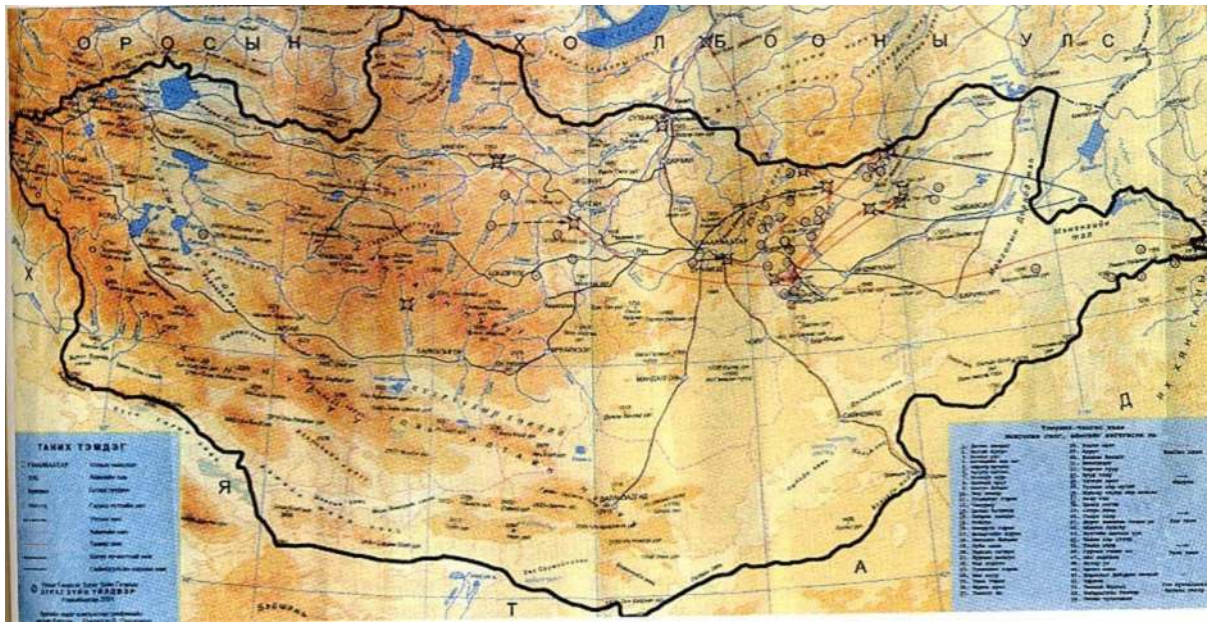

Figure 1. Map of Mongolia.

The legend of the origin of Salt Mountain and of Salt Lake

Mongolian history and mythology have very interesting stories about sources of salt, most of which say that salt is not a natural resource; instead, they would rather see it as a made by human hands and intelligence. One of the examples is from the far western region's Uvs province's Davst soum's Salt Mountain's legend (Figure 2):

Figure 2. Mongolian far Western region – Uvs province.

Once upon a time, a wealthy man had only one son. Suddenly one day, foreign enemies attacked and all citizens ran away. Speaking of misfortune brought dissipation; thieves stole their best castrated camels. When the harsh and meager times of spring came, they prepared their food and supplies and readied to leave. When they were ready to load their furniture and other stuff on the camels, none of the camels were able to get up and leave. During this hard time, their selfish relatives and neighbors had already gone long before. The grown up son said, 'I will defeat the enemies; help to organize my country.' He gathered his all best men and went to fight against them. Desperate, the old man and his wife decided to hide their treasure underground, and they packed their treasure with salt and buried it, marking it so they could come back later to dig it up. After three years of long war, the son won the war, but he did not return home with the rest of the soldiers. He stayed in the foreign country to marry another king's daughter. Many years later, the old man and his wife returned to their home country in a weary condition. After many years, they found that their hidden treasure with salt had grown into a salt hill, because of rain and soil moisture. The old man said:

No greater sorrow than a war
No bitter taste than a salt
Oh, my dear son, how can you forget your family?
Your horse with saddle
Your bowl with drinks
Your lands with people
Your steppes with livestock
No lack of food and clothes
No lack of wealth
No lack of friends
Oh, my dear son, how can you forget your elder parents?
Oh, my dear son, how can you forget your beautiful country?
Hidden treasure for my merciless son
Would be a treasure Mountain and flowing water!

After this event, the salt grew to rock hardness and became the Salt Mountain (Figures 3-5). Locals said that Salt Mountain contained ojewelss in every layer of the mountain in addition to salt. This mountain is located in Uvs province's Davst soum area. (Sukhbaatar 2001: 108-109).[1] An interesting fact about this legend is the triple description concerning the bitter side of the war suffering and the bitter taste of the salt; as a simile-metaphor, these are an example of the family's fate of farewell. Also, Mongolian folktale is saying that the worst separation is 'lived separation,' and this myth is the proof of this type of separation. In this legend, there were 'three bitter' connections tied together, such as dark side of the war separating society and lives from citizens, individual and family's lived separation and desperation, and the relation of a bag of salt and the harshness of mother earth. If we can understand logic behind this myth, salt is represented by the tears of people who suffered from sadness and desperation; on the other hand, salt was the transformed into hardened tears.

But there is another myth about the Salt Lake in Mongolian far eastern region and Khalkh's Setsen Khan Province's Ilden king area's prince To Wang or Togtokhtur Bat-Ochir (1797 – 1868), which said:

> *Mongolia made a very restricted contract with Manchuria. In this contract, Mongolia will buy two thousand carts of salt from the Manchurian Uzemchin region and in return Mongolia will give out one thousand heifers. But Manchurians were late by a couple of days from the scheduled date, and To Wang said, 'We do not have any needs for salt, you can take them back!' The angry Manchurians said, 'We will not take this back with us and we will dump them all here.' To Wang replied, 'Do not dump salt everywhere, it will pollute my land. I will show you where to dump that salt.' Then he directed them to Sangiin Dalai Lake and they dump their salt in it. Thereafter, one of the region's lakes has salt and nowadays there is Sangiin Dalai Salt manufacturing operation operating there* (Sembeejav 1991, 17 -18).[2]

In this myth, the wise lord To Wang made this restricted agreement with Manchurians, and he purposely dump one thousand carts of salt into the Sangiin Dalai Lake, because this lake did not have any salt. Afterwards, locals can season their food with salt and do not have to work hard anymore. So, these very interesting myths or stories of Salt Mountain and Salt Lake originated from Mongolia are believed to be that salt is more of a human creation and by intelligence rather than a natural mineral.

Figure 3. Uvs province's Davst soum's Salt Mountain.

[1] Sukhbaatar O. 2001. Myths on the names of Mongolian lands and places. Scientific interpretations made and compiled by Sukhbaatar O., pp.108-109. This myth was told by Baldorj Taivan from Turuun soum, Uvs province and T.Dorjlkham was recorded in 1957. Touvinians say that salt is for 'tus' and Salt Mountain for 'Tustuk'. The word 'tus' originated from old Turkic word 'tuz'. 'Tusgul nuur' in Oirat sources refers 'Salt Lake'.

[2] Sembeejav B., 1991. *Teachings of To Wang*. Editor Saintsogt S., pp. 42.Choibalsan city.

Figure 4. Uvs province's Davst soum's Salt Mountain in Summer.

Figure 5. Uvs province's Davst soum's Salt Mountain in Winter.

without salt. He said that I am neither ööld *man nor sick man, put salt in your tea'. The wise bride answered, 'I am neither torgut woman nor camel and we do not eat salt'.* [4] This traditional and daily conversation of two ethnicities was frequently heard while we were travelling Xinjiang-Uighur Mongolians between June and July 2015.

The Torgut people (torgod khum, shavi khum) were seemed to be settled in a place with plenty of salt. *The* Torgut people of Khovog Sair said:

> *'Three big salt lakes are located in Khovog Sair: 'Adgiin davsan', 'Airgiin davsan' and 'Ishig usnai davsan'. From these lakes, fresh salt was extracted. In early times, salt was located in the high desert or Gobi. People went on camels to get salt. On the way, robbery or theft frequently occurred. A group of people usually went in autumn, spring, and winter time but not in summer because of having no water in Gobi. Before extracting the salt, they made specific customs and prayed for the Earth and Heaven. Digging salt from the lake was difficult, so they extracted it in squares, then they loaded it on camels. They consume salt and also gave it to their livestock.*[5]

According to this story, Torgut people went to these three huge lakes to extract salt; therefore they consume much salt in their food.

The uses of salt

Household consumption of salt varies greatly different among Mongolians. People of the Dornod (Figure 6) steppe do not use salt in their teas but make much salty food. Western Mongolians, including bayad, dörvöd and oirat, do not use much salt in their food but much salt in their teas, because they use big rock salt to make a plate, put their food on it and lick it while eating. The Torgut people of Shinjaan oirat Mongolians use salt liberally while ööld people use it carefully, which may have been caused by the distance of salt mining. Because of this, ööld people say in their oral tradition that '*while torgut and* ööld *people are drinking tea; torgut people say that we are not* ööld*, we will use the salt affluently; while* ööld *people say 'we are not torgut, not a camel, we will not use salt too much'*.[3] An oral tradition of Khovog Sair says: '*A man of Khovog Sair went to ten* ööld *families to bring some wheat. He visited one* ööld *family and the bride offered him a tea* Ööld people avoid spilling salt everywhere and using too much in their food and tea. Because ööld people were of 'Mongol khuree,' Xinjian extracted salt from Salt Lake. They also brought a filtered salt from the sea crossing over icy mountains to Kashgar. While extracting salt, they drew '*thig*', and cut them like an ice block and loaded them two by two on a horse. The salt was considered to be a treasure or precious, because the road to salt was treacherous; on the way, they may have been killed or forcibly recruited into war. That period was when the relationship between the Russians and Manchurians was broken. The 'Salt Lake' was located in the territory of Dzungar khanate which the White king of Russia had conquered. Őöld people think that land was their own, but in fact they were considered to be thieves. Therefore, many ööld people lost their lives

[3] This was recorded from Badmaa Tanaan, 57, **ööld** man, on 20, June 2015 at 'Khonokh bag' of 'Mongol Khuree', Xinjiang-Uighur, China.

[4] This was recorded from Batnasan Jaak, 73, torgut man, on 25, June 2015 at 'Nariin khovog' of 'Jalaakin soum' in 'Tarvagatai joygiin Khovog Sair xian', Xinjiang-Uighur, China.

[5] This was recorded from Batnasan Jaak, 73, torgut man, on 25, June 2015 at 'Nariin khovog' of 'Jalaakin soum' in 'Tarvagatai joygiin Khovog Sair xian', Xinjiang-Uighur, China.

Figure 6. Mongolian far eastern region – Dornod province.

because of salt'.[6] According to the story, salt seemed to have been a strategic product that sometimes could lead to war amongst powerful countries. It can be said that the middle of the 18th century was the period when the relationship between Russia and Qing Dynasty had become strained.

Salt therapy

Salt has been used to heal various different diseases, including:

- If human bone fractures, use melted salt applying camel wool and put it on the broken bone to reduce swelling.
- If a man freezes, then apply salt to the whole body, and it will be thawed.
- Horse salt or blue salt is used for joint pai.[7]
- Torgut people of Khovog Sair say that salt has been used as a salt poultice. When a person contracts pneumonia, heat the salt folded into cotton and place it on the lung. Salt has been also used for applying like a compress to a wound.
- We use salt for swelling of a leg. If an animal eats poisonous grass, we will give salty water to the animal. If its foot is sprained, use melted salt applying to the camel with wool or cotton and put it on the sprain.
- If human hand or foot fractures, apply salt with camel mane and wrap it around the broken bone, thus reducing swelling and the lump.[8]
- There is a story in Mongolia that some people suffering from gastric disease lick salty stones and afterward were healed.

In ancient time, there was a mountain, which consisted of salty stone minerals. Locals knew that the benefits of salty stone, which is in the thick folds of a rumen, would be uncurling. But man had never tried to eat it. One man with a gastric disease, had tried many methods to heal himself, but he could not find the right method. So, he tried a salty mineral to heal the disease; then he learned of the magic power of salty stone and told others; since that time people called that mountain 'Salt Mountain'. That mountain is now situated in Uvs province (Sukhbaatar 2001, 109) .[9]

Actually, this story is a similar version of the origin of Salt Mountain but here tells the benefit of healing by salt. Mongolians generally called it as 'Jamtsdavs' (Stone salt); it means 'ocean salt' in Tibetan. Aggregation of minerals formed on the bottoms of lakes has been called as stone salt or jamtsdavs. 'Salt Mountain' covered with brown soil is located in Tagna mountain eastern range, Uvs Nuur basin. Locals called it 'Teeth Mountain' and researchers discovered that salt here contains various types of mineralsthat are necessary for the human body. 83percent of the total amount of salt resource is in Uvs province and researchers have estimated that there are approximately 3.2 million tons of salt reserves. Salt stone has five types including pink, grey, white, bluish red and yellow. It contains the chemical elements neutron, magnesium, calcium, flora, bromide, iodine, and others.[10]

According to scientists, jamtsdavs or stone salt was formed 400 million years ago. It is plentiful in western Mongolian provinces, such as Uvs, Gobi-altai, and Khovd. What is the magic of this salt? It has significant health benefit. It purifies gallbladder. When someone has a toothache, clench it between teeth and it dries up any ulcer. Using stone salt also reduces blood pressure in the elderly. When person licks jamtsdavs, it will improve digestion. Mongolians have used salt both for food and healing. Jamtsdavs is low in magnesium therefore food tastes delicious and it is suitable for any type of international foods.[11] Mongolians consider that when a newly born baby has been washed by a bone soup with salt, it helps the baby's body to be strong and healthy.

Salt traders

According to the traditional sayings of the Torgut of Khovog Sair: '*80 years ago, a poor man of Avjaan kishik, Jalaakin soum went on a walk to Gobi in autumn to bring salt. He carried square shaped salt for about 200 kms. Then he exchanged his salt for wheat and fed his family'*.[12]

Torgut people believe that salt is a treasure. It is useful for all. They say:

[6] This was recorded from Badmaa Tanaan, 57, **ööld** man, on 20, June 2015 at 'Khonokh bag' of 'Mongol Khuree', Xinjiang-Uighur, China.

[7] This was recorded from Tseejav Shar, torgut man, on 19, June 2015 at 'Bayanbulag herding field' of 'Bayangol jougiin Bayangol balgas', Xinjiang-Uighur, China.

[8] This was recorded from Batnasan Jaak, 73, torgut man, on 25, June 2015 at 'Nariin khovog' of 'Jalaakin soum' in 'Tarvagatai joygiin Khovog Sair xian', Xinjiang-Uighur, China.

[9] Sukhbaatar O., has recorded this story from Byambadorj T., director of the museum of Uvs province on 13, August, 1999.

[10] http://www.uvsnutag.mn/index.php?view=content&type=content&id=122

[11] http://www.osaka.mfa.gov.mn/index.php?option=com_content&view=article&id=187%3A2014-03-0306-08-49&catid=2%3A2010-01-29-10-35-35&lang=mn

[12] This was recorded from Batnasan Jaak, 73, torgut man, on 25, June 2015 at 'Nariin khovog' of 'Jalaakin soum' in 'Tarvagatai joygiin Khovog Sair xian', Xinjiang-Uighur, China.

There lived a man called Khambaariin Khatardag at Rocky Mountain. Khambaariin was his father's name and Khatardag was his nickname. He never rode a horse. He walked in a way that was very much like a horse's gait. While he was trotting, he was telling the epic of Janggar. He was poor but a good-hearted man. He was honest and never told lies. Every autumn he went to the rich, asking 'Give me a year-old lamb and I will bring you salt'. He prepared food and went to Adgiin davs lake to pick up salt blocks and carried them on his back for a week about 100 kms. He divided his entire salt into four pieces and each piece would be exchanged for a year-old lamb. One piece was about 40 kgs; half of it was 20 kgs, which he carried on his back, walking with a horse's gait.[13]

Figure 7. Xinjiang-Uyghur Autonomous Region.

According to the stories, people who extracted salt from Salt Lake by mining were mainly the poor but they were strong and healthy. Sometimes salt was carried by horse. Salt had been mainly extracted in entire pieces that weighed about 40 kilos. It was divided into 4 pieces of 10 kilos each. One piece of salt could be exchanged for one year-old lamb or wheat.

Salt as a magical cure

All Mongolian ethnic groups follow the same customs to use salt for magical cures when an infant cries excessively for no apparent reason. For example, ööld people of 'Mongol khuree', Xinjiang (Figure. 7) '*have a specific custom for infant; they put seven pieces of salts and coals and some infant's food on a wood charcoal fire, then turn the infant's head down to the smoke of the fire clockwise three times and vice versa. Then make a child spit on the infant's face three times then face the infant to the north or the direction of the setting sun. Finally, the infant stops crying at nights and the 'bad thing' will have disappeared. Then wipe out the infant's body with barley dough.*[14] Őöld people of this region take an oath while two people argue over the truth of something, 'If I said lies I would pee on salt'. The reason is that if someone pees on salt, bad things will happen to his children. Swearing by his children means that he told the truth. They also consider that when salt is on fire, the eyes of cattle will be blinded. When salt is in yoghurt, it will be soured.

There are some taboos related to salt among the central Khalkhs. If someone looks for his lost things while holding seven salts, then it will be found. If someone spills salt on the ground, there will be suffering until the salt melts in water. When salt is used up, there is no need to ask your neighbor; just take it. If you ask for salt from your neighbor, he will answer angrily, 'Don't ask, and just take it'. If you ask anything else from your neighbor you will need permission but not for salt. Analyzing these, salt represents a dried tear.

To summarize, the Mongolian traditional use of salt covers a wide range of activities including household consumption, healing, home remedy and cultural prohibitions/taboos that are:

1. In the stories or myths where the salt comes from it is stated that the salt is more of a human creation rather than a natural mineral.
2. Household consumption of salt varies in different regions of the country. In some areas people put salt in their food while in the other areas they don't. The same goes for tea.
3. Different ethnic groups have different levels of consumption of salt based on the distance one had to travel to extract salt. Salt has been a strategic product that sometimes could lead into war.
4. The main extractors and traders of salt were poor people. They would exchange the salt for wheat or livestock.
5. Salt has been used to heal various different internal and external diseases as well as effective home remedies for various cases.

References

Sukhbaatar, O. 2001. *Myths on the names of Mongolian lands and places*. Ulānbātar

Sembeejav, B. 1991. *Teachings of To Wang*, S. Saintsogt (ed.).

[13] The author recorded this from Buuvai Natsag, 83, Torgut man, on 25, June 2015 at 'Nariin khovog' of 'Böör soum' in 'Tarvagatai joygiin Khovog Sair xian', Xinjiang-Uighur, China

[14] This was recorded from Badmaa Tanaan, 57, **ööld** man, on 20, June 2015 at 'Khonokh bag' of 'Mongol Khuree', Xinjiang-Uighur, China.

Salt in Georgia

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Abstract

Georgia was not rich in salt; some of the lakes in the east contain mirabilite deposits in their waters. The ancient population of western Georgian got their salt from the sea water; very rich in rivers and mineral springs, that also were used as a source for salt. Rock salt, necessary for animal husbandry, can be found in the eastern regions of Georgia. South Caucasus participated in the early urban civilizations and served as a link between the cities in the south and the nomad cultures to the north. Historically salt was imported together with the spices that reached Georgia through the Silk Road. The lack of salt shaped Georgian popular culture. The harsh climatic conditions forced the mountainous population to store food for winter. Georgian songs, proverbs and folk tales indicate that obtaining salt was not an easy business. The Georgian fairy tale 'A handful and a half of salt' epitomizes the audacity and cunning that were needed in the arduous process of getting salt. Folk songs describe the anxiety of a salt-winner in his journey full of uncertainty and danger. Salt figures large in Georgian idioms and popular jokes.

Keywords: Georgia, Caucasus, salt in animal husbandry, cuisine, folklore, mineral waters.

'You are the salt of the earth, but if the salt has lost its flavour, with what will it be salted? It is then good for nothing, but to be cast out and trodden under the feet of men' (*Matthew* 5:13).

The Georgian language does not belong to the Indo-European language group, and thus it is not surprising that the word for salt is unlike that commonly used further west for sodium chloride, but is *marili* (მარილი). In antiquity the western part of Georgia was called Colchis, and the eastern kingdom was called Iberia. The other Georgian language group (of *Kartvelian* languages) comprises several related languages (Georgian, Zan, Megrelian-Laz and Svan), which derive from the ancient Colchian language. The word for salt in this language is *jim* (ჯიმ). The official language of Georgian has a writing system with its own script.

The question of salt production in Georgia has not been studied extensively, but it can be stated with some confidence that Georgia was not rich in salt and there were virtually no salt mines. Historically salt was imported from Azerbaijan, Armenia, Persia, or even from India, together with the spices that reached Georgia through the Silk Road. The importance and necessity of salt in everyday life made it into a valuable commodity, but salt itself as well as salt consumption is elusive by its nature and does not leave much in the way of archaeological evidence. Georgia is extremely rich in rivers and mineral waters, and some of these perhaps were used as a source of salt; sea water from the Black Sea might also have been used for producing salt. But there is currently a lack of scientific research in this area.

The Caucasus, since time immemorial, stood at the crossroads of cultures. The southern Caucasus was part of the early urban civilizations in Mesopotamia and served as a link between the trade centres in the south and nomad cultures in the steppes to the north (Hinbo et al. 2006: 950). Agriculture started in Georgia as early as the 7th Millennium BC, and the Shulaveri and Arukhlo cultures already demonstrate an advanced agricultural society with settlements consisting of up to 60 dwellings. The increasing population needed salt for their own diet as well as for animal husbandry.

The famous legend of the Golden Fleece speaks of the worship of a sheep skin in Colchis; this fleece was not ordinary, but was dusted with gold, the ultimate luxury, which evoked royal wealth and power. For the ancient Greeks, Colchis was the land of fabulous riches and danger, wisdom and sorcery.

As David Braund points out, salt was the main reason for trade connections between the coastal areas of Colchis and its hinterland as well as the commercial links between Iberia (east Georgia) and the Caspian region (Braund 1994: 58). Before the sixth century BC salt was only obtainable from the Black Sea by boiling and evaporating sea water (G. Klaproth 1827: 169; Lortkipanidze 1978: 34; Riehm, 1961). By the mid sixth century BC, the Colchian coastal area was dotted with

small settlements that had been there for a thousand years and that were characterized by vessels of various shapes that retained textile imprints in their clay. Perhaps the main purpose of these settlements was the production of salt from sea water (Braund 1994: 94). Towards the end of the Bronze Age the Colchian settlements had expanded towards the metal-rich mountainous regions and the early urban settlements appeared, where people would come to buy salt from these salt-producing settlements to last until the next season. Perhaps salt was shipped by the local Colchian boats, called *Kamara.* The process of Greek colonization of the Black Sea brought more intensive and developed trade with the salt producing regions; gradually salt production at the coastal areas of Colchis became redundant for the sixth century BC (Solovyev 1947).

Strabo stated that luxury goods and salt were very much sought after in Colchis and that slaves were exchanged for salt or bought for salt, as elsewhere (Pollux 7. 14; Strabo 11: 5. 6). In antiquity, salt seems to have come from the North coast of the Black Sea: from Olbia and Chersonesus (Strabo, 11. 5. 6, p. 506). Procopius wrote that the Colchians had neither salt nor wheat nor any valuable commodities and that they offered leather and slaves in exchange for the goods they desired (Procopius, *De Bellis*, 2, 15.5).

Geological survey

A geological survey conducted in Georgia revealed that *natrium sulphate* naturally occurs in the minerals of *Mirabilite* and *Thenardite*, known as *Glauber's salt*, the common name for sodium sulphate decahydrate, $Na_2SO_4 \cdot 10H_2O$. Some of the lakes in eastern Georgia contain Mirabilite deposits in their waters and in the residue of their beds. These lakes are mainly situated around Tbilisi (Avlabari, Upper and Lower Kukia, Kumisi, Mukhrovani, Gldani) and around Azamburi, south-eastern Sagarejo region (Chaliani, Kachal-Tba, Grdzeli-Tba, Sakhare-Tba). The Nadarbazevi Lake is situated in the central part of Georgia, in the Kaspi region. These lakes are supplied by bitter-salt springs, rich in *natrium sulphate*. The Sakhare-Tba and Grdzeli-Tba of the Azamburi group are surrounded by hills consisting of Lower-Sarmatian (23.7 to 5.3 million years ago) gypsum rich clay; they contain approximately 608,000 tonnes of Mirabilite. Mirabilite reserves from Mukhrovani Lake were fully exploited from the late 19th century until 1934.

The Gldani lake reserves of Mirabilite are more complex in terms of their quality and content. From 1932, the salt deposits were exploited and served as raw material for two glass factories in Avchala and Borjomi. Glass factories in Baku and Kutaisi also used Glauber's Salt extracted from these lakes. Mirabilite reserves for the year 1972 amounted to 60,000 tonnes A+B+C1. Glauber's Salt extracted in Georgia was used to make medicinal salt and was distributed all over the Soviet Union and was exported to Iran.

Most of the lakes in Georgia containing *Natrium Sulphate, Natrium Chloride, Calcium* and *Magnesium* accumulate on their bottoms mud that consists of micro-organisms suitable for treatment in balneotherapy (Kumisi, Gldani, Kukia, Lisi, Kus Tba, Nadarbazevi, Azamburi group). Medicinal mud is also concentrated around the mineral springs most notably in the Tskaltubo region, west Georgia. Mud reserves have not been calculated.

Georgia is rich in mineral springs (for a list, see Kandelaki 1933, 963-4). In 1920, the Mountain Management of Georgia (*Gornoe Upravlenie Gruzii*) produced 0.5 tonnes of high-quality table salt in Martkopi from salt springs.

Even in the 19th century, the Borjomi resort was known in Europe as the 'Russian Vichy'. Borjomi water's unique sodium rich composition and medicinal qualities are equivalent to those found in the waters of the Vichy Grand-Grille spring in France and the Silesia spring in Germany.

The first attempts to produce Borjomi mineral water industrially were made as early as 1850, when Dr. Zaharov, the apothecary of the Borjomi Military Hospital, produced and exported 1,300 bottles of mineral water.

Today Borjomi is bottled at the same spring as in 1890. From here it travels to the Georgian port of Poti and then 2000 km by sea to Illichevsk in the Ukraine and beyond. Despite the Borjomi spring having been in existence for over 1,500 years, its mineral composition remains unchanged, according to records made in 1890.

Salt and animal husbandry

Some authors (Uerpmann 1996) consider the Caucasus to be part of the area where the domestication of sheep and goats took place.

The marshlands of Colchis in western Georgia were not suitable for sheep breeding, but the rich pastures provided food for cattle almost the whole year around. Cows here were small in size, but produced a large quantity of milk, hence dairy produce was a prominent activity.

In the second century AD, Arrian noted that cattle grazed in the shallow sea waters in the coastal areas of Colchis and in this way they were getting the salt they needed (Arrian *Periplus* 8).

Mountain goats and sheep were native to the Caucasus. Excavations of an Upper Palaeolithic site in the

Dzudzuana Cave (in western Georgia) produced more than 1500 fibres of flax and wool (Bar-Yosef et al. 2011: 331-349). Felt and woollen production was the major source of clothing in the mountainous regions of Georgia: the felt coats (*nabadi*), hats, woollen woven socks and dresses defined the national identity of the inhabitants of the Tusheti and Khevsureti regions. David Braund suggests that the semi-mythical goat *tragelaphus,* frequently depicted on Persian and Greek silver rhytons, textiles and ceramics may have inhabited the environs–of the river Phasis (Braund 1994: 84). It has been estimated that 80% of sheep in Georgia are raised on transhumance systems (Dimitriev 1989). They winter on low steppe ranges and are then moved to summer mountain pastures, at altitudes of 2,000-3,000 m, anything between 200 and 500 km away from their winter quarters. The native Georgian breeds include Tushin, Imeritian, and Gala. Today's Trans-Caucasian breeds originate from the Caucasian fat-tailed sheep and are grouped as merino breeds (Ryder 1983; Dimitriev 1989). According to both legend and the measurement of wool remains, the Black Sea coast produced the finest wool of the ancient world. However, in more recent times the native sheep of Trans-Caucasia seem to have been coarse wool breeds (Ryder 1983).

Sheep raising requires rock salt, or salt licks, for natural licks are essential for sheep wellbeing; rock salt is rich in biometals (calcium, iron, phosphorus, sodium, etc.) for muscle and bone growth in spring time. Historically, as well as in recent times, sheep husbandry took place in the eastern part of Georgia, especially in the mountain regions of Tusheti and Kakheti.

Rock salt, the crystallized form of *natrium chloride*, can be found in the eastern regions of Georgia, in the villages of Lakhshevi and Abin in the Akhaltsikhe region and in the Tianeti region in the villages of Omalo and Jakalo. In Kakheti the deposits of rock salt correspond to the winter pastures (Iatag, Kurgulukh-Iatag, Buga-Maidan). Rock salt was known and used by the locals in the environs of Martkopi, near Tbilisi. These deposits have not been investigated. (Kandelaki 1933: 961-965).

Ancient salt mines in South Caucasus

Recent archaeological excavations conducted by a French-Azerbaijani team has revealed the world's most ancient salt mines in Duzdagi near Nakhichevan in Azerbaijan. Nakhichevan was situated on the former Silk Route connecting Tabriz with Constantinople. The Duzdagi salt mines were mined intensively during the Bronze Age (from the end of the third to the first half of the second Millennium BC). The graves of four workers and their inventory have been attributed to the Middle Neolithic period. Further investigation showed that the salt mines belong to the Kura-Araxes Culture with the help of ceramic remains typical of the Kura-Araxes Culture, which stretched from eastern Georgia to Palestine. But the earliest date for salt mining at Duzdagi could be as early as the second half of the 5th Millennium BC. The mines had an elaborate tunnelling system; the variety of stone tools, both micro- and macrolithic; stone tools weighing between 10 and 30 kg and mostly made of river pebbles, have been unearthed in great quantity. The Duzdagi salt mines produced tonnes of salt over the millennia and could have supplied the population of the Caucasus and beyond. Other salt mines in the region were attested in Tuzluca (*Tuz* and *Duz* mean 'salt' in Turkish and Azeri) in Turkey and Duzdagi near Khoy in Iran. The Nakhichevan salt mines are still exploited. The excavations aim to determine the modes of salt extraction and to reveal the earliest evidence for exploitation. The political, ritual, and symbolic meaning of salt in the ancient Near East and Caucasus was as important as any nutritional value it may have possessed (Marro *et al.* 2010). It should be noted, that recent excavations at Sakdrisi, Georgia, revealed the world's oldest gold mines, also attributed to the Kura-Araxes Culture, which suggests that 5,000 years ago the population of the southern Caucasus lived in highly organized societies that were able to determine their trading priorities, to exploit and monopolize natural resources, and to mobilize manpower for the complex process of mining luxury commodities (gold), or life's necessities such as salt.

The Çankiri salt mines in northern Turkey (Anatolia) are as early as 3000 BC and were intensively exploited during the Hittite Empire (1400-1200 BC). Over the centuries salt was produced here on an industrial scale and quantity supplying neighbouring regions with this important commodity.

Salt in Georgian folklore

Historically, the population of the mountainous regions of Georgia imported salt from distant lands. These regions were isolated from the rest of the world between late autumn and late spring, when roads become impassable. The harsh climatic conditions forced the population to store food for winter, and thus salt became paramount as a natural preservative. Georgian songs, proverbs and folk tales indicate that obtaining salt was not an easy business. The Georgian folk song 'Urmuli' ('cart' song) describes the peasants' ordeal during the long journey to Aghzevan (in Turkey) with an ox cart, pulled by his loyal oxen:

'Let us go to Aghzevan for salt and return home laden with crystal salt, first I'll embrace my mother, then my son and wife. You are my hope, my buffalo, your calves take me on my journey for salt; go ahead my oxen, don't drive me into an abyss, don't make my family mourn for me. God bless me, for I am overwhelmed with worries about my family...'

There is a Georgian fairy story entitled 'One and a half handfuls'. It is a cautionary tale of a peasant who sets off for a journey to the town to get a handful of salt, where, however, he has several misadventures; his responses and conduct are always considered to be inappropriate; the poor man is beaten up on every occasion and goes back home empty-handed. The moral of the story is that money alone cannot buy salt, and one should be more diplomatic. One should not only know other peoples' customs and traditions but one should be a smart decision-maker as well.

Salt figures large in popular jokes. For example, there is the tale of a man who broke a lifetime's silence only to express his dissatisfaction about ill-seasoned food; when asked why he had kept silence all these years, he replied, 'my meat had enough salt until now'. When somebody dies, Georgians would say jokingly that he had 'gone for salt'. There is a Georgian proverb: 'Do a good thing and sprinkle it with salt', meaning that just as salt makes food taste good and unites the ingredients, so too must good conduct be carried out. A wholesome person might be described as 'salty'.

Georgia adopted Christianity in the 4th century, thus the Christian tradition of the 'covenant of salt' (Numbers 18:19; 2 Chron. 13:5) symbolizing an everlasting covenant between God and his people. Georgian feasts were called 'bread and salt' since salt was a compulsory feature of the table (supra). The supra became the most important part of Georgian social life, being a symbol of unity during religious feasts and family events. Communities gather together at the supra to share happiness and sorrow. The tradition of the supra, led by a toastmaster (tamada) became institutionalized and created a social bond within communities, during which agreements might be achieved and disputes settled. Families and social groups display extraordinary hospitality towards the guests, who are obliged to obey the rules set by tamada.

Salt in Georgian cuisine

Georgian cuisine is a mixture of local, Middle Eastern and East European culinary traditions; it is rich in fresh and cooked vegetables, grilled and stewed meat and poultry dishes, dairy products, sauces and condiments. Each historical region of Georgia has its own specialty based on local produce. Georgian cuisine is renowned for its variety and uniqueness; it contains some ancient recipes that predate sugar, cornmeal, potatoes or tomatoes. The Colchian Plain in western Georgia was mostly marshy; its wetlands were not suitable for wheat. The mountainous regions grew barley and oats, still used in the Svaneti region. The staple diet for the western Georgian population (ancient Colchian) was millet porridge boiled in water and chestnut bread, both without added salt. Millet is resistant to moist conditions in storage, a valuable property on the wetland plain of Colchis (Braund 1994: 55). The Byzantine army fought Sasanian Persia in Colchis in the sixth century and their local diet of millet became a problem as rations of millet were given to soldiers as punishment. Roman generals were not particularly fond of millet and even complained about the local Colchian food to the emperor (Braund 1989).

Since the 17th century, corn became the staple diet in western Georgia, replacing millet and chestnut: *ghomi,* the local *mamaliga* is made of cornmeal with added cornflour; corn bread (*chadi*) is baked or fried in oil. The fact that these major foods have no added salt perhaps reflects the times when salt was difficult to obtain. Eastern Georgia was better supplied with salt through the Silk Road, and thus the food here is less bland. The eastern Georgian cuisine is based on wheat; the local bread *puri* is well seasoned, has a prolonged shape and is baked in an open clay oven, *tone.*

The lack of salt also influenced the way that food was preserved. Pickled vegetables such as cabbage, beetroot, and later pepper and tomatoes came from Eastern Europe and became compulsory appetizers for Georgian banquets (*supra*). Pickled vegetables in Georgian are called *mjhave* (sour); the same word is used for mineral waters (*mjhave tskali*). The process of marinating probably involved mineral waters and the ancient recipe for marinating was to make brine with mineral water. Traditional pickled vegetables were made of native plants. *Jonjoli* (*Staphylea colchica* or Bladdernut) is an ornamental shrub, native to west Georgia, the sprouts of which are pickled and garnished with sunflower oil and onion rings.

Another local pickle is *kejhera*. *Kejhera* is one of the oldest plants belonging to the cabbage family (*Brassica*); it is native to the Colchian plain and still exists in the wild. The elongated roots of the plant are pickled and seasoned with ground walnut and garlic paste. Both *jonjoli* (also marinated in brine) and *kejhera* are traditional Georgian appetizers and are served as side dishes. Georgians prefer fresh meat, such as grilled or stewed fish, beef, chicken, pork and lamb. A famous smoked ham comes from the Racha region, and Megrelia offers excellent sausage (*kupati*). Perhaps a relative lack of salt meant that Georgian cuisine has otherwise very little salted fish, meat, sausages, ham or cheeses. Preserved meat was mostly dried or smoked.

Svaneti, the highest inhabited mountainous region in Europe, was notoriously short of salt. There are numerous mineral waters in Svaneti, but they do not contain enough iodine for the locals' diet, and the population suffered from thyroid problems for

generations. The Georgian film director Mikhail Kalatozov made a brilliant film 'Jim Shvante' (*Salt of Svaneti* [1930]), one of the earliest artistic documentaries in the world.

One of the favourite Georgian condiments, 'Svaneti salt', was recently granted National Heritage status by the Ministry of Culture of Georgia. This is a delicious combination of dried garlic, herbs and spices mixed in with salt in order to make a small amount of salt go further.

Georgia has a rich tradition of family remedies. Many families still keep and practice herbal mixtures and ointments for different skin and gastric conditions. Georgian mineral waters such as Borjomi, Nabeghlavi, Sairme, Bakhmaro are famous for their medicinal qualities, and they are more or less sodium rich. 'Many Russians and Georgians prize the strongly mineralized taste of Borjomi even today, because the strong taste is felt to be a sign of its medicinal properties' (Manning 2012: 96).

Georgian mineral waters are widely used to prevent and cure stomach ulcers and liver, gallbladder, kidney and endocrinal dysfunctions. Yet there is very little evidence for using salt for medicinal purposes. Medicinal remedies were compiled in the popular book 'Karabadin', edited by Zaza Panaskertel-Tsitsishvili in the 15th century. Further studies might reveal more information about the subject matter.

Nowadays Georgia imports salt from neighbouring countries such as Russia, Armenia and Iran, as well as from Ukraine and Poland. There was a scandal recently in Georgia concerning imported Iranian salt that contained lead and mercury, harmful for health. The principal distributor of salt today is 'SLG/Salt Line Georgia'.

References

Bar-Yosef, O., Belfer-Cohen, A., Meshveliani, T., Jakeli, N., Bar-Oz, G., Boaretto, E., Goldberg, P., Kvavadze, E., and Matskevich, Z. 2011. Dzudzuana: an Upper Palaeolithic cave site in the Caucasus foothills (Georgia). *Antiquity* 85, 328: 331-349.

Braund, D. 1989. Coping with the Caucasus: Roman responses to local conditions in Colchis. In D. H. French and C. S. Lightfoot (eds.), *The Eastern Frontier of the Roman Empire: Proceedings of a Colloquium held at Ankara in September 1988*: 31-43. Oxford, British Archaeological Reports.

Braund, D. 1994. *Georgia in Antiquity: A History of Colchis and Transcaucasian Iberia, 550 BC – AD 562*. Oxford, Clarendon Press.

Hirbo, J., Muigai, A., Naqvi, A. N, Rege, E. and Hanotte O. 2006. The genetic diversity of Trans-Caucasian native sheep breeds. *Asian-Australasian Journal of Animal Science* 19: 943-952.

Kacharava, D. 1933. Glauberova sol (Glauber Salt), *Gostechizdat Gruzii*: 106-118.

Kandelaki, A. 1933. Sol pavarennaya (Table salt). In *Mineralnie resursi gruzinskoi SSR*, *Gostekhizdat Gruzii,'Tekhnika da Shroma'*: 961-965.

Hauptmann, A., Klein, S. 2009. Bronze Age gold in Southern Georgia. *ArcheoSciences* 33: 75–82.

Klaproth, M. 1827. *Tableau historique, géographique, ethnographique et politique du Caucase et des provinces limitrophes entre la Russie et la Perse*. Paris, Hachette Livre BNF.

Lortkipanidze, G. 1978. *Kolkhida v 6-2 vekax do nasheieri* (Colchis in the 6-2 c BC).

Manning, P. 2012. *Semiotics of Drink and Drinking*, London and New York, Continuum.

Marro, C., Bakhshaliyev V., and Sanz S. 2010. Archaeological investigations on the salt mine of Duzdagi (Nakhichevan, Azerbaijan). *Türkiye Bilimler Akademisi Arkeolojidergisi* 13: 229–244.

Riehm, K. 1961. Prehistoric salt boiling. *Antiquity* 35: 181-91.

Ryder, M. 1983. *Sheep and Man*. London, Duckworth.

Solovyev, L. 1947, Sledi drevnego solyanogo promisla bliz g. Sukhumi i g. Ochamchire (Traces of salt production in the environs of the towns Sukhumi and Ochamchira). In *Trudi Abkhazskogo Gosudarstvennogo Muzeya* (*Works of the Abkhazian State Museum*): 23-56.

Stöllner, T. and Hauptmann, A. 2015. Salt, copper, gold: Early mining in the Caucasus. Deutsches Bergbau-Museum, Bochum.

Tvalchrelidze, A., 1998. Sakartvelos mkari mineraluri resursebi (Solid mineral resources of Georgia). *Biuleteni N9*: 20-21.

Uerpmann, H. 1996. Animal domestication - accident or intention. In D. R. Harris (ed.): *The Origins and Spread of Agriculture and Pastoralism in Eurasia*: 227-237. London: UCL Press.

Vashakidze, G., 1974. Gruzinskaya SSR, Poleznye iskopaemye (Georgian SSR, Commercially exploited minerals). *Geologia SSSR* 10: 228-229.

Salt, History and Culture in the Western Grasslands of Cameroon

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Abstract

This paper examines the socio-cultural value of salt among the people of the western grasslands of Cameroon from the precolonial era to contemporary times. Salt was and still is an important condiment which is used in households, marriages, treatment of the sick, initiation and other cultural ceremonies throughout the western grasslands and elsewhere in Cameroon. It was a priceless and rare commodity in the past and this explains the high value that was attached to it by all. It also played a cutting-edge role in the political economy of many ethnic groups across Africa from production to commercialisation. Young people from different ethnic groups in the western grasslands undertook long and tedious journeys to sell different commodities like kernels and mats and in return bought this scarce and precious commodity for retail or various socio-cultural uses. Important village notables and traditional rulers stored salt in locally made containers and made it available when this was needed. Salt which was at one-time a very scarce commodity is in abundance today. One no longer needs to trek for days, weeks and months to procure it as in the pre-colonial and colonial past. Many njangi, or local spend-thrift societies, are known to buy salt in huge quantities for their members. This usually takes place towards the end of year when festivities like Christmas and New Year demand the use of salt. Family heads also keep and share salt to their kith and kin as a responsibility. Through a content analysis of existing literature, interviews and observations, this paper probes into the history and cultural meanings and uses attached to this important condiment in the western grasslands of Cameroon, known for its very rich and diverse cultural practices.

Keywords: Cameroon, Grasslands, Salt, Culture, Initiation.

Introduction

The importance of salt in regional trade, dowry payment, seasoning, trade currency, wedding rituals, as a gift to nursing mothers, appeasement of a discontented party, and royal privileges, among others cannot be over-emphasised (Afigbo 1973: 86; Diagne 1992; Kah 2006: 1-3; Kah 2016: 60).[1] Diagne (1992: 40) also argues that salt was an important item in regional trade on the Guinea and Equatorial coasts in the 16th century under Portuguese hegemony. It was also an important item in the early regional trade in central Tanzania and throughout Ethiopia. The Kongo kingdom and other neighbouring groups traded salt as part of regional trade. The importance attached to the salt trade was because it was a necessity of life, especially to people who lived mainly on vegetable foods (Haberland 1992: 709; Ochieng 1992: 838-839; Vansina 1992: 547). Arabs were intermediaries in the salt trade between North and West Africa during the pre-colonial period (Falola 1992; Perinbam 1996).

While a lot has been written on the politico-economic importance of salt in different regions of Africa since the pre-colonial period, this paper broadens the historiography of this condiment to discuss its socio-cultural significance. This paper does this by taking into consideration the culturally diverse and rich western grassland region of Cameroon. Its people are known to have been very mobile in the history of migration in Cameroon dating back to the period of migration and settlement. This paper therefore contents itself with an examination of the history and socio-cultural importance of salt in the western grasslands today known as the North West Region of Cameroon. The North West Region is a region of great and rich cultural and social activities in Cameroon. The people are proud and defend their culture. They also perform different symbol-rich rituals to valorise this culture. Cameroon's western grasslands is generally located at an altitude of 1000 to 3000m above sea level. It is also an area of ethnic and cultural diversity characteristic of the cultural heterogeneity of Cameroon (Pelican 2012: 166). Cameroon has over 280 ethnic groups according to linguistic classification.

In spite of the decline in indigenous salt production in Africa during the colonial period, in Ada, in the Volta River area of West Africa, indigenous salt production resisted the negative impact of colonial rule (Maier 1986; Sutton 1981: 43; Williamson 1956; Yankowski 2007: 24-47). There was also salt trade between the Cross River basin and the grassland communities of Cameroon. The Banyang for example were intermediaries between the salt producing villages like Baje and Mbakang in the Cross River basin and the grassland communities, especially those neighbouring the Cross River (Kah 2006: 3) in language and geography. In the grasslands

[1] File No 512, Af 4, Assessment Reports, Anyang-Manta Tribes Mamfe Division British Southern Cameroons, National Archives Buea, (NAB); File No. Af 15a, Report on the Bangwa Area 1942, NAB.

of Cameroon, the commercialisation of salt was ably regulated by the royal household. This regulation by the royal household was known as royal trade. Much of it was preserved in long bars and disposed of whenever it was demanded (Nkwi 1987: 117-118). The fact that the royal household was directly implicated in the salt business shows that salt was an important and scarce commodity that needed to be regulated to serve, first, the needs of the highly placed in society before others in the lower rung of the social ladder. Different commodities were deeply involved in the trade of salt. The Bamum for example imported salt from other places (M'bokolo 1992: 519). In other parts of Africa, like in Kebbi in Nigeria, salt was traded with the Nupe, Ilorin, and Gwanja people (Laya 1992: 479).

Methodology and significance of study

The methodology employed in this study is essentially based on a collection of data from secondary and primary sources related to salt. We have also relied heavily on observation, participant observation and discussions with people who have used or benefitted from salt because of their position within the traditional society in the western grasslands of Cameroon. Such people include members of male and female regulatory societies, notables, ritual leaders and members of meeting groups. Participant observation offered us the opportunity of getting first information about salt and how this has been and is still used for various socio-cultural purposes in the western grasslands of Cameroon. The one-on-one interviews also gave us an opportunity to appreciate the socio-cultural significance of salt not only in the western but also other socio-cultural regions of Cameroon.

Salt has from time immemorial been variously used for medicinal and seasoning purposes by different communities the world over. Among the Shuar and Ahuar of the southern Montana in Ecuador, salt was traditionally used by their people for medicinal purposes. Those who did not regularly eat salt among these people of this region were considered by the others as simply uncivilised (Pomeroy 1988: 147). This kind of description is not limited to the Shuar and Ahuar. In many other African societies that used salt for various socio-cultural, economic, and political reasons salt was considered an important condiment. This was more so because the commodity was often used for curative purposes, especially by herbalists and other Seers of the society. Salt was also an indelible ethnic marker by some communities in different parts of the world. For example, among Andean groups in Ecuador, salt appeared to have been a common component of cultural and symbolic dialogue. They therefore made salt to play an important role in cultural dialogue and also in symbolic activities within their society. It was also observed in the 16th century that salt and hot pepper were the principal condiments for the highlanders of Ecuador and without equal. It was therefore with pride that the highlanders of Ecuador ate salt combined with hot pepper. These two went together and people could not be seen to eat one without the other. The people also argued that the inclusion of salt in meals was an indication of membership in society and social structure, and it was also considered to be tasteful.

The Spanish who were the colonial masters of Ecuador soon learnt about the curative use of Ecuadorian salt and actively went for it at two major sites. This was to also participate in its exploitation, commercialisation and use. The salt of the Salinas-Bolivar settlement in Ecuador was particularly renowned because it was able to 'clear obstructions' in the body, including curing goiter. Rural people of neighbouring Salinas-Bolivar today are full of praise for Salinas salt because of its medicinal properties. The salt is a preventive medicine for cattle. When cattle and horses are given Salinas salt on a regular basis, they stay healthy. This salt also treats human ailments. Among these human aliments are respiratory problems (Pomeroy 1988: 148), which the people greatly appreciate. The Salinas-Bolivar salt was in fact a great cultural marker and the people were proud of this because it made them unique.

In some communities, at particular times, having salt is worth more than gold and explains the problems that were associated with its scarcity. During World War II, salt generated the greatest upheavals among Nigerians, as reported in newspapers such as the *West African Pilot* and in oral commentary by citizens of the country. These upheavals made the colonial government very disturbed and concerned. This was because salt was of utmost importance to the diets of Nigerians and the people could not do without this condiment (Falola 1992: 412). Its absence would cause problems between the colonial authorities and the colonial subjects. In most regions of the world, beginning from the pre-colonial period, salt is important or highly valued because it is an essential addition to healthy food. The movement of many groups from a nomadic to an agricultural life was dependent on the availability of salt. Salt therefore facilitated the migration of people from one place to another. During the early stage of human development, salt was a necessity of life and communities with natural salty springs jealously preserved them as gifts from God (Kobe 1958: 61), while others could only access them if they were permitted to do so. It was argued by Potts (1984: 225) that to be considered civilised a person needed salt which was a rare commodity. Besides, the soil contains only a portion of the salt and other minerals that are found in the spring water (Duggar 1920: 307). Among the Mande of West Africa, salt played an important role towards social stability, lineage

continuity, and harmonious gender relations (Perinbam 1996: 273). Salt was therefore not only important for trade across the Sahara Desert into the Middle East but played an important social role in keeping the peace in Mande society. Its significance was also seen in how it promoted gender participation in different aspects of its production, use, and commercialisation.

The socio-cultural importance of salt cannot be understated in many African communities. Many Africans living in villages or rural settings and feeding on vegetables rich in potassium and low in sodium have a craving for salt. This is because it adds flavour to their meals. Children take delight in sucking a small amount of salt. The Cewa people on their part consider salt to add savour to food and also serves as a vehicle for the transmission of a dreaded skin disease, *mdulo* (Williamson 1956: 82). This disease involves the swelling of the face, wrist, and ankles. The disease was sometimes accompanied with coughing and always with great weakness and wasting and often resulted in the death of the patient. A woman was not expected to add salt when she was menstruating because she would harm all those who ate her dish. Many of the Cewa women respected this cultural belief. Besides, a woman who had illicit intercourse would inflict *mdulo* on her husband if she put salt in his *ndiwo* (food). Salt therefore became important in controlling adultery within Cewa society. When a man was given unsalted *ndiwo* it was an indication of guilt from the wife. Women therefore became very cautious in order not to be accused of giving unsalted *ndiwo* to their husbands. Similarly, when men went to produce or collect salt, they were also not expected to have sexual intercourse, and no man was to eat salt that they have not all previously tasted. When a man also bought a bag of salt for sale in the village, he usually gave all the villagers a pinch of it to taste before he started selling it. Salt was therefore a rallying and unifying force and promoted communalism. Protection from disease caused by salt involved buying medicine from the tribal doctor at a very high price (Williamson 1956: 85-87). This was therefore a dis-incentive to a kind of behaviour that would lead to the purchasing of medicine at a very high cost. The production and procurement of salt had a culture of its own.

Production and procurement of salt

Salt production in sub-Saharan Africa has a long history dating back to the distant past. The production of this condiment in many societies followed generally the same pattern although there were differences in methodology. The production process of this resource in several areas generally revolved around leaching salt-rich material like soil or plant ash to make brine and then reduce it into crystalline salt. The resultant brine was reduced to salt by means of slow-boiling over an open fire. In some cases, boiling vessels were a little more than moulds. These moulds were broken to remove the salt after a single use (Antonites 2013: 106). Among the Cewa (Chewa) in Nyasaland (now Malawi), prior to the advent of colonial rule, local salts were made from various earths. In the Kota Kota District for example, the earth near the lake was used to produced salt for use and in the Kasungu District in the 1940s, women were deeply involved in the preparation of salt (Williamson 1956: 83). This showed the importance of gender in the salt business at least at the level of extraction to production.

In some parts of West Africa, water was carefully channelled into shallow ponds. This water was then evaporated in the heat of the sun. What remained on the ground after evaporation was a thick salty crust.

This salty crust was then scraped and purified by mixing it with warm water. After the mixing, it was poured through cone-shaped baskets which were filled with straw. This was then re-dried in the sun to obtain the much needed salt (Fyfe 1968: 239) for several uses. Still in other areas of the region without marine salt, grasses or reeds that contained a high saline content were cultivated on plots in marshes or rivers to obtain salt. When these reeds were ready they were harvested in the dry season, burnt and their ashes were leached to collect potassium salt. In the marine settlements, sea salt was collected through natural evaporation from sea-pans or by boiling sea water (Fanso 1989:63; Vansina 1990: 86). In Igboland in Eastern Nigeria, bitter herbs were used in place of salt, but later on the people started burning grass and dissolving the ashes in water. The solution was then evaporated over low fire to obtain salt (Afigbo 1973: 68).

Several other ethnic groups in different parts of Africa were involved in the production of salt for various socio-cultural and economic reasons. The Nunu and the Ntomba from the 18th century onwards were producers of salt in addition to other economic activities like pottery and sugar-cane alcohol for the Congo River market. Rock and vegetable salt from Mbosi country was, in fact, a vitally important item that was produced mostly by riverine peoples along the waterways (M'bokolo 1992: 540-541). In addition, the Luo and the Walowa of East Africa were active participants in salt-mining as one of their most important economic activities. In central Tanzania, most of the people produced small quantities of salt by burning grass or collecting surface deposits since high quality sources were rare. The major exploitable saltpans were found in Ugogo and at Ivuna, Kanyenge, Lake Balangida, Singida and Lake Eyasi and at Bukune and Bulungwa south of Kahama. The Bunyuro of Uganda also possessed rich salt deposits (Connah 1996). The culture within Kebbi

society in the Hausa States of Nigeria was that every producer of salt gave the *Kanta* as tax one gourd a year (Ochieng 1992: 839; Lava 1992: 472; Webster *et al* 1992: 795). Salt production also took place amongthe sedentary Kanembu and Buduma, and Borno controlled all easily accessible sources of mineral salts at places such as Muniyo, Bilma and around Lake Chad (Barkindo 1992: 512). The production of salt across the length and breadth of Africa was a clear indication that this condiment was crucial in the daily lives of the people and especially in their political economy.

Salt was locally produced within many areas prior to its importation from other areas into the western grasslands. Generally throughout the savanna region of Cameroon local chieftains were those charged with the supervision of the production and sale of this precious and scarce socio-cultural and economic resource (Nkwi 1987: 117-118). In the Kom kingdom, mineral sources of salt were exploited and kept in segments of bamboos. Similarly, there was an important mineral salt deposit at Bamessing in Ndop, which was exploited by the people for the community and other groups. Neighbouring Bamunka was also involved in the production of its own salt from vegetable sources. This was carried out in the immediate pre-colonial era (Fowler 1990: 410-411).

The procurement of salt for various socio-cultural uses in the western grasslands of Cameroon came from two principal directions. The Akwana salt was one of them and came from the north through the Kom Kingdom. The salt was also brought into the area through several Nso intermediaries. In spite of the argument that the presence of salt in the Kom kingdom was the Akwana salt from the north, some Kom informants eargued that their first salt came all the way from Bagham and Bamendjinda in the eastern grasslands. The salt from thse two settlements which was imported into the western grasslands was black and wrapped in leaves.

Salt also came into the western grasslands from the South and West. The one from the South was from the Cross River salt springs. The middlemen in the trade from the South and West were from Bali Nyonga, Banyang villages, Bagham and Bamileke villages in general. Some communities, however, produced vegetable salts and some limited mineral salt deposits (Fowler 1990: 409; Kah 2006). The salt that came into the western grasslands from the South found its way into Babungo through Bangolan traders, who got it from Bagham and northern Bamileke chiefdoms through exchange with cowries. Baba traders also used Babungo iron wares in exchange for salt in Bamendjinda. They then traded the salt so obtained for cowries from the Nso and Oku people. Other traders from the Ndop plain chiefdoms, such as Bamunka and Baba, travelled to the northern Bamileke chiefdoms and Bagham, where they bought salt and exchanged it with cloth from Nso. The cloth was again sold at these Bamileke chiefdoms and Bagham, where more salt was bought for sale to the Nso. Apart from salt coming into other western grasslands regions from the Bamileke chiefdoms, salt also came through Bali Nyonga. It was sold for brass rings to traders from Babanki Tungo and then to Bamessing, where it was likely bought with cowries (Fowler 1990: 410). The procurement of salt for the different chiefdoms of the western grasslands of Cameroon was made possible by numerous traders and who made a living out of this mineral. Salt played a very important role in the socio-cultural life of the people of the western grasslands of Cameroon in particular and in other communities in the world.

Socio-cultural importance of salt

In the production of caerphilly-type cheese from cow's milk in the western highlands of Cameroon by the Fulani and some other indigenous people, salt has always been one of the ingredients (Mendi *et al* 2000). Among young people in the North West Region of the country, after a performance at a funeral, festival or any joyous activity, they distributed the salt and other gifts that were given them as part of the general entertainment. Within the Laimbwe ethnic group of Menchum and Boyo Divisions of the North West Region for example, the *mezhuuh* masquerade of young boys usually still perform during funeral ceremonies, and, among the things given for their entertainment, was salt together with corn fufu and vegetables or any other available sauce. They distributed this salt according to age or seniority, and it was taken home for use in the preparation of food by their parents.

Similarly, members of credit-rotating meetings, or *njangis*, in the western grasslands of Cameroon have a longstanding tradition of buying salt and sharing it with members at the end of the year. Salt was a very scarce commodity for households during the pre-colonial and part of the colonial period. In order to provide this precious household condiment to many homes, the meetings decided to buy and distribute it in appreciable quantities so that families could consume it for a long time. Salt was bought from a distant place, and it was usually from the profit of lending money or loans that were given to members of these *njangi* societies. In some cases, people were called upon to contribute money for the eventual purchase of this condiment. The salt was distributed among members and towards the end of year so that they could use it in the end of year festivities like Christmas and New Year. Some households even gave others presents of salt during this period of the year. This practice has become more or less enshrined in the by-laws of these meetings and the practice has become widespread

in many villages of this region of Cameroon. Today, meetings compete with one another in the quantity of salt bought for their members. The more salt a meeting buys, the greater its chances of having new members at the start of a new year.

In the distant and recent past, when someone possessed great quantities of salt, like among the Babungo people of the Ndop plain of the western grassfields, it brought a stream of kin and neighbours to beg for it. Salt was therefore a uniting force and created a community spirit among those who had it and those who relied on them to have it for their own households. A bulk quantity of the condiment also facilitated its use in regional trade in for slaves. In Bali Nyonga, bundles of salt packed in large conical baskets were exchanged for slaves. Two of these were equivalent to a slave (Fowler 1990: 409-410). Salt was therefore so important that people lost their freedom because they were given in exchange for it. This was also indicative of the fact that people gained a higher social status in society because they were able to procure it. Among the Bambui people of Mezam Division, salt is one of the important items listed in the payment of bride wealth. The other items include money, farm labour, wine, oil, firewood, food items, household utensils and clothing (Amungwa 2015: 21). This condiment is therefore important in marital arrangements and in the establishment of a bond between different families.

Among the Babungo, therefore, the possession of salt obligated the one who possessed it to develop a culture of sharing with those who needed it. Salt promoted a culture of communalism. It would have been a terrible thing or a sign of wickedness to have possessed this precious commodity and remain indifferent or decided not to be generous to others who needed it for home use. Slavery was an important social institution within the different chiefdoms of the western grasslands and was also promoted or sustained through the ownership of a bulk quantity of the condiment. Wealthy people through regional trade were able to keep or raise their social status by exchanging salt for slaves. These slaves further boosted their social status through labour services in their farms and other businesses. Salt therefore not only served an economic purpose through trade, it also perpetuated the slavery institution. It also increased the social status of many ethnic groups of the western grasslands, such as those of the Ndop plain chiefdoms, Bali Nyonga and others that were involved in the salt business, because they could use it for various cultural activities.

Among the Bamileke of the eastern grasslands of Cameroon, the traditional Priest offers sacrifices of salt and other items like oil, meat and palm wine to the 'gods' or the almighty through the agency of spirits and ancestors. They perform this sacrifice to ask for God's help following the birth of a child. This sacrifice is also performed when someone is sick, when a woman has trouble getting pregnant, or when a traditional seer receives a message that a propitious moment has arrived (Schrag 2004: 7). Similar sacrifices involving the use or consumption of salt are performed by the many diverse ethnic groups of the western grasslands of Cameroon. When sacrifices or ritual activities are organised in appreciation of birth, in honour of the dead and other related activities, salt has always been one of the items used. There was always a traditional Priest who carried out this ritual. In other cases, the family or lineage heads performed them, or the traditional regulatory society, such as the *nwerong*, *ngumba* and *kwifon* among the Nso, Bali and the Tikar speaking villages, led the ritual.

The Laimbwe of the North West Region usually travelled to Nkongsamba in French-speaking Cameroon during the colonial period to sell mats. In return, they bought salt and helped one another to transport it over hundreds of kilometres to the village. This was because salt was an essential item for bride wealth among the people (Kah 2013: 62). Additionally, the Noni people of Bui Division in the western grasslands paid tribute to the Fon of Nso in the form of leopards, lions, tigers and hyenas during the pre-colonial period. In return for Noni subservience, the Fon of Nso gave them, among other things, salt. The salt was sent to the Fon of Noni. The other items which the Noni people got from the Fon of Nso included palm oil, caps, clay pipes, guns, cloth, and other rare goods (Nfi 2014: 64). In Menchum Division of the North West Region of the Western Grasslands, salt was one of the important items that was demanded for initiation into social clubs, the regulatory societies and in the payment of bride wealth. The other items apart from salt were palm oil (Tem and Nyoh 2013: 22), a precious commodity for households. People from around Katsina Ala River made this salt available for use in marriage and initiation ceremonies. They acquired this rare commodity from Nigeria (Tem and Nyoh 2013: 23). In Nso, among other things, men had the responsibility of providing salt to members of their families (Chem-Langhee 1995: 179). This was because as a scarce commodity, they went for salt to provide it to family members. Among the Yamba of the Donga Mantung Division of the North West Region of Cameroon salt giving also formed part of the marriage payments (Gufler 1995: 97). This payment was not limited to the beginning but throughout marital life.

Salt also played an important role when death celebrations were organised in many parts of the grasslands of Cameroon. Among the Laimbwe people of Menchum and Boyo Divisions, a bag of salt has come to be equated with a goat during the ceremonies following the death of a member of the *kuiifuai* regulatory society. The family gets together to raise the number of goats

and bags of salt required by the society. Some of the salt is used as a condiment after the goats and pigs are killed and boiled. The quantity left is then distributed by members of *kuiifuai*. The distribution takes into consideration grade in the regulatory society. Members of a higher grade get more salt than those of the lower grade. Usually, members of the *ikuum* society, the apex lodge of *kuiifuai,* go home with a greater quantity of salt, followed by those at the *kooh* lodge, followed by those not yet in the *kooh* lodge.

Ordinary members of the regulatory society usually go home with the smallest quantity of the condiment. This is to encourage them to seek membership into higher grades. When salt is given for general entertainment of the villagers, whoever is present is given a quantity of salt to carry it home. In addition, masqueraders that perform during the funeral of a member are usually given a bag of salt when the bereaved family is unable to provide a goat for entertainment. Members of the different masquerades benefit. This is because the salt is distributed among them to take home for collective use and to give to others who are in need. The more salt that members of regulatory societies get from entertainment during funeral ceremonies, the longer they stay before they can buy salt. Generally, during memorial services or final death celebrations in the dry season, from December to March, many members of regulatory societies and masquerade or juju societies get a lot of salt and may go for the whole year without buying salt for their families and other uses.

Salt has been an important condiment for roasted fowls during death celebrations or any ritual activity in many parts of the western grasslands of Cameroon in general and Laimbwe ethnic group in particular (Kah 2016: 60). When people die, their families present fowls to different groups of people. These include those who dug the grave, the carpenters who made the coffin, and the group gathered. Additionally, during blessing rituals associated with the farms and fertility, fowls were provided and eventually roasted and seasoned with salt. After a fowl was roasted and well-seasoned by young boys at a fire-place, it was cut into smaller quantities and put into a bowl with salt and oil to taste. The bowl was made of clay, but today people use a store-bought dish. A lot of salt was added to the roasted fowl but not much oil. This was because, with a small quantity of the fowl, one could eat a big loaf of corn fufu. Salt always made the roasted fowl taste better. Little children also practiced eating green, red or yellow pepper with salt and corn fufu.

There was a misleading impression that the one who ate salt and pepper was intelligent at school. Although this thinking is no longer very strong, in rural areas of the western grasslands, school children still thinking that eating pepper with salt makes one very intelligent. Salt has therefore not only been important to season roasted fowl, but it has also been associated with intelligence when one consumes it. Many traditional healers across the western grasslands often demand payment for their services with salt and other items like cutlasses, blankets, fowls, and money. The more people they treat, the more salt they will get from the families as payment. As they accumulate more salt, they either eventually share it with family members and friends or sell it for additional money.

The traditional herbalists, many of whom are inundating the towns, do not ask salt in payment for treating patients in addition to other items. However, they also use it to prepare medicines or herbal concoctions and other material for their patients, many of whom are politicians seeking influential positions in society or poor citizens who cannot afford to pay for hospital bills when they fall sick. They add salt to these concoctions to taste so that patients can easily consume them.

In addition, initiations into social clubs and other societies within the ethnic groups of the western grasslands of Cameroon include the provision of salt. In the Laimbwe villages, for instance, salt is one of the items used during initiation into the *tschong* or friction drum society (Kah 2015: 151; Kah 2016: forthcoming). Other social clubs ask for salt as one of the pre-conditions for membership, and when a member dies they use salt. This is also used in the charms and medicines associated with these clubs and societies.

Figure 1. Meh'tomtom used for the Preservation of Salt among the Laimbwe (Author's collection, 2015).

Without salt, therefore, one might not be admitted into any of these clubs and societies. The charms will also be incomplete if salt is not used.

Hunters and trappers have used salt for the seasoning of meat before it is ready for the market. When hunters kill an animal, especially in the rainy season, they need to season it for the market. They season it with salt and place it over a fire-place to dry in order to prevent the meat from decaying. Trappers, on the other hand, have used salt to attract animals to the trap, and many people who keep goats buy salt to feed and domesticate them. In these ways, salt has become useful to hunters, trappers, and people who rear domestic animals. Other elders preserved salt in special containers for these purposes and also to share among children and family members in the family compounds. When children are called to collect salt from their father or family head, it is to recognise and appreciate them for the support they give their father, and it is considered responsible behaviour on the part of the father. There are usually special containers where salt is stored in the western grasslands and among the Laimbwe speaking people in particular. These containers were Indian bamboos and locally known among the Laimbwe as *Pheh'tomtom* (sing.). Figure 1 is a picture of two of these *Meh'tomtom* (pl.), in which salt was preserved by elders in Bu village for very long periods. This was usually stored in a dry place in the house or on the *Uta'ahghe*, an elevated place over a fire-place used for preservation among the Laimbwe of Cameroon.

The *Meh'tomtom* are elongated and have ropes to facilitate carrying them. In the past, Laimbwe fathers, for example, went to funeral celebrations with their child carrying one of these *Pheh'tomotom*t. The salt was given to a member of the bereaved family for use during the celebration. Salt was a very scarce commodity, so when one went with a Pheh'tomtom of it, this was greatly appreciated by those who were in charge of the funeral celebration. Part of it was used during the funeral ceremony of the dead person, and the remainder was preserved for use in a future funeral or other cultural activity.

Conclusion

In this paper we have examined the socio-cultural importance and uses of salt in the western grasslands of Cameroon. The paper first situates the importance of salt in different parts of the world and at different points in history. The paper also recognises that salt played a very important role in the long distance trade of the past and helped to link communities to one another and to keep the community spirit alive. We also examined the processes of salt production and associated rituals in different parts of the world and particularly in Africa.

Salt played an important role in the socio-cultural and the political economy of many chiefdoms of the western grasslands. Salt at one time served as a medium of exchange, and it also consolidated kinship ties between people of the same environment. Considering the scarcity, and yet the importance of salt, those who possessed it could use it to purchase slaves. Others got salt to facilitate initiation into regulatory societies and to pay for the bride wealth of their wives. Parents-in-law therefore held in very high esteem those sons-in-law who were able to travel long distances to buy salt for their bride wealth. This is because they could use this salt to share with their children and to organise death ceremonies for family members. Salt has become a condiment of friendship and of great socio-cultural significance in this region of Cameroon.

References

Afigbo, A. E. 1973. Trade and Trade Routes in Nineteenth Century Nsukka. *Journal of the Historical Society of Nigeria* 7: 77-90.

Amungwa, A. F. 2015. African Cultures at the Crossroads: An Ethnographic Analysis of the Bambui People of North West Cameroon. *Advanced Journal of Environmental Management* 2, 1: 17-27.

Antonites, A. 2013. Archaeological Salt Production at the Baleni Spring, Northeastern South Africa. *The South African Archaeological Bulletin* 68, 198: 105-118.

Barkindo, B. M. 1992. Kanem-Borno: Its Relations with the Mediterranean Sea, Bagirmi and Other States in the Chad Basin. In B. A. Ogot (ed.), *General History of Africa V: Africa from the Sixteenth to the Eighteenth Century*: 492-514. California, Heinemann.

Chem-Langhee, Bongfen. 1995. Slavery and Slave Marketing in Nso in the Nineteenth Century. *Paideuma: Mitteilungen zur Kulturkunde* 41: 177-190.

Connah, G. 1996. *Kibiro: The Salt of Bunyoro, Past and Present*. British Institute in East Africa, Memoir.

Diagne, P. 1992. African Political, Economic and Social Structures during this Period. In B. A. Ogot (ed.), *General History of Africa V: Africa from the Sixteenth to the Eighteenth Century*: 23-45. California, Heinemann.

Duggar, B. M. 1920. The Use of 'Insoluble' Salts in Balanced Solutions for Seed Plants. *Annals of the Missouri Botanical Garden* 7, 4: 307-327.

Falola, T. 1992. Salt is Gold: The Management of Salt Scarcity in Nigeria during World War II. *Canadian Journal of African Studies* 26, 3: 412-436.

Fanso, V. G. 1989. *Cameroon History for Secondary Schools and Colleges Vol. I: From Prehistoric Times to the Nineteenth Century*. London, Macmillan.

Fowler, I. 1990. Babungo: A Study of Iron Production, Trade and Power in a Nineteenth Century Ndop Plain Chiefdom (Cameroons). Unpublished PhD thesis, University College London.

Fyfe, C. 1968. West African Trade A.D. 1000-1800. In J. F. Ade Ajayi (ed.) *A Thousand Years of West African History*: 238-252. Ibadan, Ibadan University Press.

Gufler, H. 1995. Yamba Marriage Systems and Spouses and their Offspring between Protection and Affliction. *Anthropos* 90, 1/3: 89-108.

Haberland, E. 1992. The Horn of Africa. In B. A. Ogot (ed.) *General History of Africa V: Africa from the Sixteenth to the Eighteenth Century*: 703-749. California, Heinemann.

Kah, H. K. 2006. A Priceless Commodity: The Politics of Salt Production and Commercialisation in the Cross River Basin of Cameroon 1916-1961. *African Study Monographs* 21, 1: 1-13.

Kah, H. K. 2013. Gender and Livestock Farming in Laimbweland, Cameroon 1980s- 2011. *Journal of Sustainable Development in Africa* 15, 1: 56-72.

Kah, H. K. 2015. *The Sacred Forest: Gender and Matriliny in the Laimbwe History c. 1750-2001*. Münster, Lit Verlag

Kah, H. K. 2016. The Laimbwe *Ih'neem*/Ritual Ceremony, Food Crisis, and Sustainability in Cameroon. *Journal of Global Initiatives: Policy, Pedagogy, Perspective* 10, 2: 53-70.

Kah, H. K. 2016. Ritual Use of Currency in Laimbwe History, Cameroon. *Journal for Studies in Humanities and Social Sciences*.

Kobe, C. U. A. 1958. Salt. *Monumenta Nipponica* 14, 1/2: 61-90.

Laya, D. 1992. 'he Hausa States. In B. A. Ogot (ed.) *General History of Africa V: Africa from the Sixteenth to the Eighteenth Century*: 453-491. California, Heinemann.

Maier, D. J. E. 1986. Colonial Distortion of the Volta River Salt Trade. *African Economic History* 15: 13-37.

M'bokolo, E. 1992. From the Cameroon Grasslands to the Upper Nile. In B. A. Ogot (ed.), *General History of Africa V: Africa from the Sixteenth to the Eighteenth Century*: 515-545. California, Heinemann.

Mendi, S. D., Tiku, K. P. and Imele, H. 2000. Adapted Technology for Small-Scale Manufacture of Caerphilly-type Cheese from Cow's Milk in the Western Highlands of Cameroon. *The Journal of Food Technology in Africa* 5, 4: 120-122.

Nfi, J., 2014. Intercommunity Relations and the Politics of Identity in the Nso Chiefdom Bamenda Grassfields, Cameroon. *Journal Research in Peace, Gender and Development* 4, 4: 63-69.

Nkwi, P. N. 1987. *Traditional Diplomacy: A Study of Inter-Chiefdom Relations in the Western Grassfields North West Province of Cameroon*. Department of Sociology, University of Yaounde.

Ochieng, W. R. 1992. The Interior of East Africa: The Peoples of Kenya and Tanzania, 1500-1800. In B. A. Ogot (ed.) *General History of Africa V: Africa from the Sixteenth to the Eighteenth Century*: 828-848. California, Heinemann.

Pelican, M. 2012. Friendship among Pastoral Fulbe in Northwest Cameroon. *African Study Monographs* 33, 3: 165-188.

Perinbam, B. M. 1996. The Salt-Gold Alchemy in the Eighteenth and Nineteenth Century Mande World: If Men Are its Salt, Women Are its Gold. *History in Africa* 23: 257-278.

Pomeroy, C. 1988. The Salt of Highland Ecuador: Precious Products of a Female Domain. *Ethnohistory* 35, 2: 131-160.

Potts, D. 1984. On Salt and Salt Gathering in Ancient Mesopotamia. *Journal of the Economic and Social History of the Orient* 27, 3: 225-271.

Schrag, B. 2004. *Musical Invigoration of Cultural Dynamism in a Bamileke Dance Association*. Yaounde, Ministry of Scientific and Technical Research.

Sutton, I. B. 1981. The Volta River Salt Trade: The Survival of an Indigenous Industry. *Journal of African History* 22: 43-61.

Tem, P. M. and Hyasinth, A. N. 2013. War, Skirmishes and Socio-Economic Activities in Pre-Colonial Menchum ca. 1740 to 1902: Factors for Inter-Ethnic Relations. *Global South* 9, 3: 19-25.

Vansina, J. 1990. *Paths in the Rainforests: Toward a History of Political Tradition in Equatorial Africa.* London, James Curry.

Vansina, J. 1992. The Kongo Kingdom and its Neighbours. In B. A. Ogot (ed.), *General History of Africa V: Africa from the Sixteenth to the Eighteenth Century*, 546-587. California, Heinemann.

Webster, J. B., Ogot, B. A. and Chretien J. P. 1992. The Great Lakes Region, 1500-1800. In B. A. Ogot (ed.), *General History of Africa V: Africa from the Sixteenth to the Eighteenth Century*: 776-827. California, Heinemann.

Williamson, J. 1956. Salt and Potashes in the Life of the Cewa. *The Nyasaland Journal* 9, 1: 82-87.

Unity of Sacred and Profane in the Traditional Salt Industry of the Okposi Igbo of South-Eastern Nigeria

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Abstract

An important rite of passage for a woman in Okposi, a community of the Igbo of south-eastern districts of Nigeria was the establishment of a family salt industry, which she afterwards takes charge of. Salt making is an all-woman affair that excludes men and unmarried women. No one knows the exact date that this industry began. Literacy is relatively nascent here, dating back to only late 1920s. What is clear is that social and economic life here is traditionally intertwined with the indigenously produced salt. The community's cognomen reflects this fact. It is called Okposi, *Epa na-esi Mmahí* (Okposi, They that Make Salt). In the middle of the town stands the only pan-community statute reflecting the group's collective identity in the form of a stylized depiction of the lady salt maker (see Figure 1). The traditional salt industry here has its shrine where male priests officiate but cannot themselves make the salt. Besides economics, the aspects of social life that are traditionally mediated by this industry include religion, chronometry, and marriage rites. For the anthropologist, adaptations of the salt customs in reaction to social change in the Nigerian nation-state and the global community may provide insight into morphology of culture in general. The customary industry's reaction to the nation-state's needs was outstanding during the Nigerian civil war when lack of salt for the rest of the Biafran side was so acute. But with the direct pressure of globalisation, the industry has now seriously declined in preference to imported salt. Decline in the industry was only possible after demonization of the indigenous culture as inferior and retrogressive, and the concomitant projection of the Western-style practices as modern and desirable. I relied on participant observation of the complete participant variety to conduct the study, which has spanned 10 years from 2005 to 2015.

Keywords: Okposi Igbo, salt making, tradition, rite of passage, globalization.

Background

Salt making is so central to life in this Nigerian community that its members hail it with an alias which says exactly that. The name of the community is Okposi but its proud denizens eulogize it as *Ẹpa na-esi mmahị*, or *Ẹka na-esi mmahị* (meaning, 'They that make salt,' or 'The home of salt making'). This is said more or less in the sense that the United States is referred to as 'Uncle Sam.' Salt making here is not a recent industry. It is as old as the community. In traditional times, all girls born into the community were taught the skill, the same as every woman that was married into the community from a different place. Salt making in Okposi is an all-women industry. Women are in charge of everything from the extraction of the raw material right up to the design and construction of the production hut. It is tabooed to men. Men are excluded, except insofar as they may be involved in trades that are ancillary to the industry. On two occasions in recent history after contact with Europeans, such exclusion had made women wealthier than the male folk. These times were during the Second World War and during the Nigerian civil war when the rest of Nigerians in neighbouring districts came to depend on the Okposi salt because the alternative sources got closed.

Figure 1. Okposi salt-maker statue. On her head is the earthen pot that she uses to fetch the brine. In her hand is the finished product.

Okposi is one of the more than 300 communities that make up the Igbo, one of Nigeria's three largest ethnic groups, the other being the Hausa and the Yoruba. Before the British colonisation in the 19th century each of those Igbo groups was for all practical purposes autonomous of each other, although there is also ample historical and ethnographic evidence of economic and cultural interdependence among them.

They all speak a common variety of the Niger-Congo family of languages. Dialects in this language are as many as the constituent communities and are frequently coterminous with them, each of the dialects being named after the community that speaks it. Pre-contact technology and the indigenous economy were also along the communal boundaries. For example, some communities, such as the Awka and the Ezza, were known for their working of iron, and some, such as the Aro, were known for mercantile activities. It was in such a sense that the Okposi gained its fame for salt technology.

Salt production seemed to have been widespread in the district where the Okposi is located but none of the other communities seemed to have rivalled the Okposi in the quality or quantity of the product. Two factors explain Okposi's pre-eminence in the industry of the indigenous salt, one of which is natural and fortuitous, and the other factitious and attributable to the social organisation of the community itself.

The first is the location of the Okposi's major brine lake which partly explains the year-round high salinity of the brine. Unlike similar sources of brine in two other communities, Oshiri and Uburu, Okposi's brine lake is insulated from any other large body of water and so is safe from freshwater flooding, even in the rainy season. Okposi's closest neighbour to the west, the Uburu, has a lake that is of comparable high salinity but it loses this quality once the rains start. At that time the waters from the Ẹsụ River (tributary of the more familiar River Cross) inundates it, causing it to lose its salinity. The other lakes with salt contents in Oshiri or even Okposi itself are not near rivers but nonetheless their salt content is low, whatever period of the year. Western-style comparative chemical analyses of these lakes have not been carried out. However, since early 20th century the two major salt lakes in Okposi and Uburu and the indigenous economy that they gave rise to have fascinated ethnographers and historians (Agwu 2015; Egujuru 1989; Isichei 1977). A Japanese group tried to study the Okposi lake in 1970s but the project appeared to be inconclusive.

Nexus of religion, economics and sociality

To be a member of the Okposi community is to be in one way or the other connected with the autochthonous salt industry. The Okposi traditional belief system regulates how the salt is made. It defines who will participate at all stages, from the extraction of the raw material to its processing and marketing. There is a lineage of priests who see to this and take their name from the priesthood. They are known as *Ọha Mmahị* (the Salt Lake Community).

Originally, fetching of the brine to be used in production of salt was the exclusive right of women who had gone through the rite of passage of adulthood and had married. The two were necessary conditions for admission into the all-women, pan-community salt-making guild. The rite of passage included clitoridectomy and the celebrations that went with it, something that the culture-bearers called *ibuugwu* (literally, circumcision rites). Usually, an age set of girls underwent the rites when their cohort was mature for marriage. Until as recently as early 1960s it was strange to find a girl who remained single when her age set had married. Circumcision rites were a complex of cultural processes that included a package of social training on how to become a woman in a culturally acceptable manner. Usually, a girl progressed from that experience to marriage. Salt-making being women's key economic activity in this community, the bride would have acquired some competence in this before marriage. In her husband's house she was assisted by the elder more practised women among her affines and not infrequently by her mother and her elder sisters (if she had these) to set up her own manufacturing facility. Up until the rest past, it was a taboo, viewed with horror by the culture-bearers, for an unmarried or an 'uncircumcised' woman to fetch the brine.

Central to the salt-making facility that the young woman would need was the *èwè*. A Church of Scotland missionary who visited the district in 1918 called the hut 'salt pitch' but it seems not to be an accurate description of what to all intents and purposes is a peculiar architecture (Isichei, 1977: 244). Egejuru (1989) calls it 'salt hut', which as far as physical form goes is more acceptable than the description in Isichei but still does not help in the untranslatable term of the culture-bearer. A woman builds her *ewe* herself with the help of her female relatives or female in-laws. The purpose of the building is to increase the salinity of the brine before the evaporation process that would produce the salt. Increasing the salinity will reduce the time and the fuel that will be needed, and of course also raise the yield.

The description of the salinification hut in Isichie (1977) and the one in Egejuru (1989) brings out two points. The architecture and the purpose has not changed for nearly a century, and that the hut is the same in Okposi and the neighbouring community, Uburu, where production of the commodity is on a smaller scale. Isichei (1977: 244) quotes the lady missionary, whom she calls simply Mrs.

Arnot, as reporting regarding the *èwè* in Uburu where the Church of Scotland had just established the first Western-style medical facility in the district:

They make what they call salt pitches. A pitch consists of a mud erection – a long heap about twelve feet long and three feet high, clay pots slightly perforated in the bottom are built into the top of the heap, and under each pot another pot is set inside the heap. The top row of the pots are the filters. A layer of the sand and ashes is put in, then the salt water is allowed to filter through. The filtrate is then withdrawn and boiled to get the salt.

Egujuru (1989: 19) wrote later, 'An *Ewe* is half-walled hut made of treaded mud. In between the walls are wedged in the filtered pots. Each filtering pot has a filtered brine drips into a receiving pot which sits on the floor or what forms the foundation of the hut.'

More than Money

Salt making among the Okposi goes beyond a simple process for securing livelihood in a traditional economic institution. I have already identified its place in the rite of passage that admits the female member of the society from girlhood to womanhood, as culturally defined in the sociality of this group. So, it can be seen that salt-making also provides the criteria for regulating marriage, family and kinship domains. Medicine men recommend it for some forms of stomach problems. In communities that believe in witchcraft, a stock of the salt in a house is believed to make such a place impervious to the effects of attack.

The Okposi salt has probably played more roles in the traditional society than any other material object. Not only was it one of the three major items in the economic exchange in pre-contact and early days of contact of southern Nigeria with Europeans, at a point it was itself used as money. The other items were slaves and textiles. In the Igbo culture area, which is roughly one-half of southern Nigeria, there were three major inter-communal markets, each associated with a particular commodity. One was in Nsukka in the northern districts. It was known for the indigenous cotton fabric. The others were the Uburu market, where the Okposi salt supplemented the supply that was locally produced there (Uburu). Another was in the southern district of Bende that was associated with slaves. Bende was closest to the shores in those days of the trans-Atlantic slave trade. The Okposi salt was known to consumers outside the district as Uburu salt, after the market where it was bought. Originally, the market for the salt was also in Okposi until there was a disagreement with the Aro, a mercantile Igbo group, who controlled the three revolving fairs (Afigbo 1983; Egejuru 1989). Of all the items on the market at the time, salt was the one that every family had a need for and was the most portable. It satisfied the need for a medium of exchange in the earliest post-barter economy and so was also used as such. I spoke to the king of one of the traditional Igbo communities who told me that in his domain, the salt was still being used, if symbolically, as part of the bride wealth in nuptial rites (Ugoagha, 2016). 'Oh yes, we still do. Salt is one of the items that a groom must give to his in-laws. Of course, it is largely in a symbolic form these days.'

A Chronograph of Sorts

The *ewe* technology provided a precision time-keeping device in days before contact with Western-style chronometry. Egejuru, who has studied the technology, was amazed at the effectiveness of the *ewe* chronograph. The time measurement is a secondary derivation from the filtering process that I have referred to. Egejuru's description merits being quoted in full (1989: 21):

> The filtering pot which is perforated at the bottom is first lined with a layer of ash after the hole at the bottom is plugged with a soft sponge of dried cocoyam[1] leaf stalk. Next, a certain amount of dried treated soil is poured on top of the ash leaving enough room to hold a reasonable quantity of salt water to be filtered. Salt water is then poured on top of the soil and allowed to sit for about two hours before the hole at the bottom of the filtering pot is unplugged to allow filtered water to drip into the receiving pot below. Unplugging the hole is achieved by piercing through the soft sponge covering the hole with a short dried hollow reed which is left in place throughout the filtering. Usually this piercing of the hole known as *itufu aja* takes place around 9.00 p.m. when the family is about to retire to bed. By the time the family wakes up in the morning the filtering is all done and the filtered brine sits in the receiving pot waiting for the hole to be unplugged to the time the last drop of filtered water drips into the receiving pot. In those days, filtering through the night provided a means of reckoning time. For instance, if one wanted to go somewhere very early in the morning, one went to the salt hut and listened to the dripping water. If one heard some dripping, one knew that it was yet too early to go, but if the dripping had ceased even though daylight was not visible, one would know that the time was right to leave.

Five in the morning is usually considered a reasonable time for early risers in this community. If filtering starts by 9 p.m., then it means that this process has a count-down capacity of eight hours.

[1] There are several species of these plants of the genus, *Colocasia*, that are native to west Africa.

Production

The final production is by evaporation through boiling in an open fire. It takes about six hours to fully evaporate 20 litres of brine. Fagots are the only source of fuel, there being no gas, coal or any other options. This Hobson's choice in terms of fuel compels the community to grow trees to be cut afterwards for fuel. Fetching the firewood and making of the salt are the key economic productions for women in the traditional division of labour here. Their importance is such that anything that may bar any of them is tragic indeed. A ritual dirge sung only at the funeral of a female member of the community underlines the centrality of these activities:

> When a woman of valour passes on
> It is decreed
> No one should go in search of firewood
> Nor go to fetch the brine.

The heap of crystals will now be formed into shapes using clay moulds. The type that was used as money in times past was in triangular shapes just big enough to fill a man's open palm. The one that is used for general purposes is bigger. Although not tabooed as such, it is unusual to market salt without first moulding it into a solid shape. Ordinarily the larger size fetches the higher price.

Effects of westernisation

A lot has changed about the Okposi salt making, all driven by the effects of exogenous systems, first from Christianity, and afterwards by colonisation and globalisation. Ill-advised acculturation has caused salt production to lose its prestige.

As converts to the Christian sects grew in number, there was pressure that later led to the de-prohibition of fetching of the brine to those who had not undergone the *ibuugwu* rite of passage into womanhood. Since 1968 women who got married without undergoing the *ibuugwu* rite of passage may fetch the brine but unmarried women are still barred (Nweze 2006).

Not many women want to make salt anymore. The common preference these days is trading and salaried employment in the white-collar jobs that the officialdom and big businesses in the cities can offer. In researching for this paper, I met informants who spoke about the industry as if it belonged to the past. Perhaps the best illustration of the neglect of the industry is that I could not find a functional *ewe* salt hut. Up until early 1980s practically every homestead around the brine lake had several of such. Big-time manufacturers now supply all the markets, including Okposi's, with the loose, Western-style table salt that is mass produced in factories elsewhere in Nigeria or imported. A restructuring of women's economic activities is going on but that does not excuse the impending erasure in the collective memory of an industry that sustained the community for centuries and from which it derived its identity. Ribeiro & Escobar (2006) have warned against a freefall into modernity. as Although change is inevitable, it is something to be approached with social responsibility and caution.

Figure 2. Okposi's great salt lake.

In the Okposi case, unless salvage ethnographers intervene and document the skills and method for the production of the indigenous salt, they might soon be lost for good when the generation that witnessed them dies out. Establishment of a museum at the site will also help. Such a museum should have all the artefacts related to this traditional industry and have its keepers trained in the skills and production methods so that they can demonstrate them to visitors. Only the biggest of the lakes is now attended to (Figure 2). I visited two minor ones and they are both overgrown with weeds.

References

Afigbo, A. 1983. *An outline of Igbo history.* Owerri RADA.

Agwu, C. 2015. *Migratory history and settlement of the people of Ohaozara*. Enugu, Cheston Books.

Egejuru, P. 1989. Salt culture in Ọkpọsị. In *Anụ* 5: 16 – 27.

Isichei, E. 1977. *Igbo worlds*. London, MacMillan.

Nweze, N. 2006. Okposi ethics and values. In Nweze, N. (ed.), *Ani Ọkpọsi Eka-nesi Mmahi*: 24 – 37. Abakaliki, Saltcoast Treasures Organisation.

Ribeiro, G. and Escobar, A. 2006. World anthropologies – disciplinary transformations within systems of power. In Ribeiro, G. & Escobar, A. (eds.). *World anthropologies – disciplinary transformations within systems of power*: 1 – 25. Oxford, Berg.

Salt in the Traditions of the Romanians.
Notes for the Intangible Heritage in Dâmbovița County

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Abstract

In this article are reviewed the curative, apotropaic and traditional rituals that imply the use of salt in the south-Carpathian areas, more precisely from the county of Dâmboviţa. The restructuration of the traditional way of life in this county occurred earlier than in other areas, in the middle of the XIXth century, and consequently eluded ethnographic studies. Therefore, I was surprised that they are still in practice or that remaining in the memory of some people are the curative magic formulas, customs and interdictions, oracular practices and other forms of sacred salt utilization. All the traditions identified in this area between the middle course of the river Dâmbovița and upper course of the river Ialomiţa were compared and compiled with those documented in other Romanian ethnographic areas.

Keywords: salt, magical use, ethnography, southern Romania.

In Romania, where solid or liquid natural sources of salt are abundant, the recurrent potential of the area was recognized, and therefore a new approach gained ground in ethno-archaeological and anthropological research regarding the use of salt (Alexianu *et al.* 2007; Alexianu *et al.* 2011; Alexianu *et al.* 2015).

The results of studies over the last twenty years for eastern and intra-Carpathian areas encouraged me to investigate some of the aspects of the social and economical relevance of salt in a diachronic perspective, in the Curvature Carpathians area, more specifically in the county of Dâmbovița. The field research undertaken between 2010 and 2013 brought new data regarding modern exploitation of salty springs or mountains of salt (Popovici *et al.* 2015), and the GIS analysis suggested the domestic exploitation of halite in Ocnița since Prehistory (Ilie *et al.* 2013). From the start, the investigation in the middle basin of the river Dâmbovița and the upper basin of the river Ialomiţa were largely meant to collect the immaterial heritage coded in beliefs, superstitions, curses, interdictions, and enchantments.

Symbolic and magical use of salt has rarely been investigated (Avram 2005; Ciaușanu 2001: 227-233; Ciobanu 2010; Dăncuș 2006; Diaconu 2013; Monah 2008; Niculică-Voronca 1998: 152-155; Olteanu 1998: 234-236; 1999: 357-359) and I believe that the profound transformations of Romanian society that started in the second half of the nineteenth century will lead to the permanent loss of these traditions. This convinced me of the necessity and urgency to publish these results.

The starting point of the article is the data collected through ethnographic inquiries in villages in Dâmbovița. These data have been compiled with studies that supplement the map of practices and beliefs recorded in the first half of the twentieth century in Dâmbovița, compared and completed with those from other regions.

The inquiries were carried out in 2012 and 2013 with the help of colleagues living in rural areas and history students from the Valachia University in Târgovişte, applying a model previously used in eastern-Carpathian areas (Alexianu et al 2007: 44-57) (Figure 1). We noticed qualitative differences in the obtained data; nonetheless, some have value in the form of recording the traditions, others for revealing the frequency of the practices.

Salt in the protection rituals for milk producing animals

In Candeşti, Dâmbovița, in the middle of the twentieth century, the traditional '*hora*' (dance in which the performers form a ring) of Whitsuntide was held around a 'block of salt and wool so that the herds will thrive' (Catenescu 1940). On this occasion '*călușarii*' were present. These traditional dancers perform a Romanian hobbyhorse dance done in wild steps and fierce mock combat by members of a sworn brotherhood.

This cattle protection ritual is also encountered in slightly different forms in other parts of Romania and it has two steps – first, the disenchantment of salt; second, the use of sacred salt.

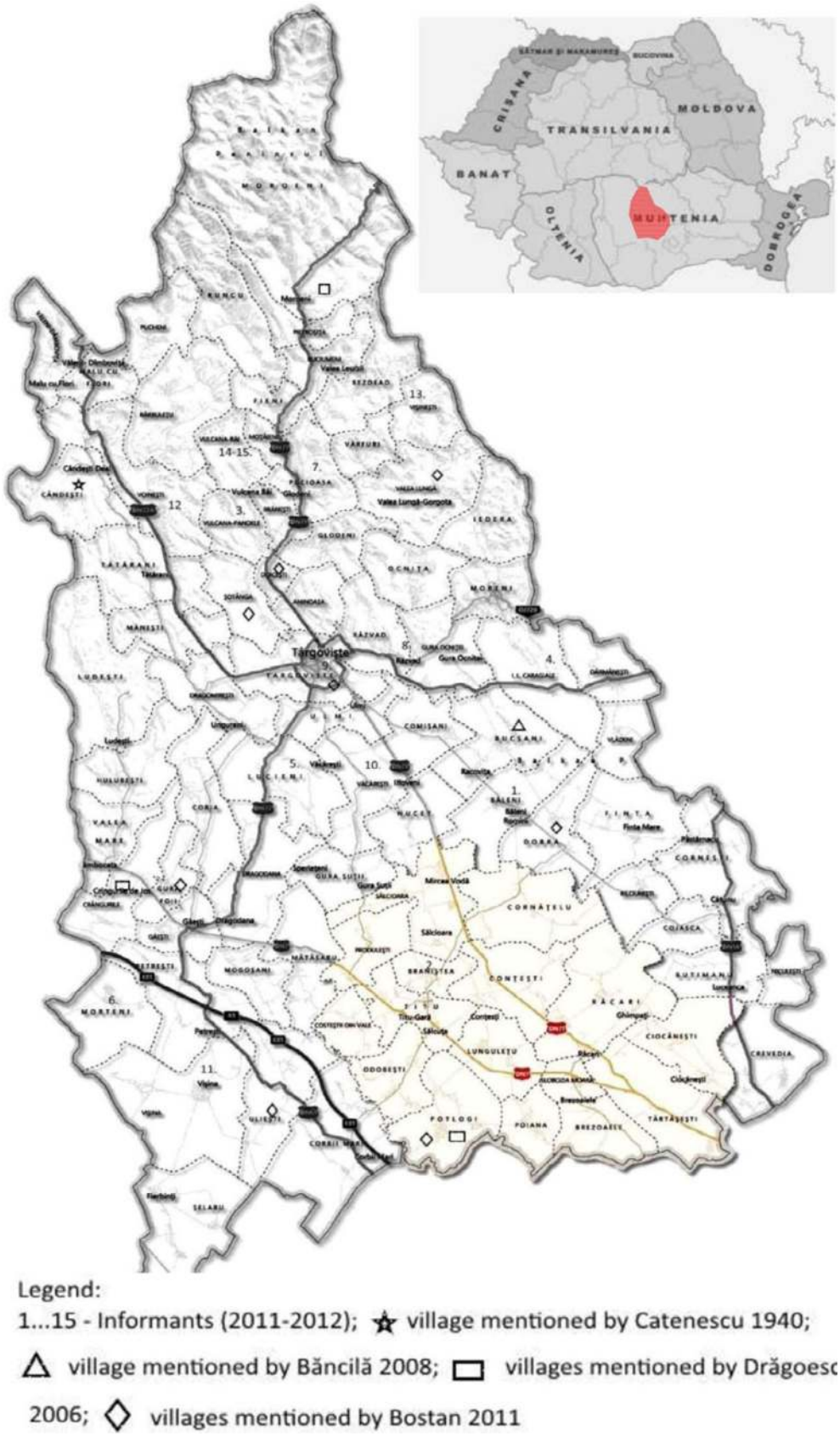

Figure 1. The Romanian historical regions and the part of Dâmbovița County covered by the ethnographical information.

For example, in Banat, on Christmas Eve, at the end of the nineteenth or beginning of the twentieth century, the sheep owners used to place a lump of salt, closely wrapped in a cloth under the doorstep of the barn. It is left there until April 22nd, the date of the Chosen '*Alesul*', when some of the salt is milled, mixed with bran and maize flour, and fed to the sheep. The remaining lump is called 'salt of the lamb' and it is saved to keep the lambs healthy (Marian 1901: 235). The Chosen is a shepherd's celebration starting on April 21st and ending with the St. George/Gheorghe's rituals on April 23rd. It marks the beginning of the pasturage season – from the breeding season to the celebration of *St. Dumitru* or *Sumedru* (October 26th) (Ghinoiu 1988: 48; 229-230; Ghinoiu 1997: 171-173).

Once the rituals of the Chosen were performed, the day of St. George's started with enchantments of the flock – clean water to which salt had been added was sprinkled on the herd and an incantation was recited: 'As the sheep is born clean and untouched, so the herds stay untouched by magic and by '*Hale!*' (misery, wretchedness),' after which the sheep are milked and the cowshed, the herd, the shepherds and the homemakers who arrived with food for the shepherds are sprinkled with magical water (Marian 1901: 238-239).

A similar magical practice was performed on '*Sângiorz*', St. George's, by the shepherds in the Banat Mountains. The pretzel, mixed with salt, used on that feast was fed to the sheep in order to prevent the cuckoo from taking away the fat ('*mana*') from the milk (Ghinoiu 1988: 234).

In Bucovina, this tradition could be traced by the statement: 'the remainder of the salt block found in cowsheds and animal sheds are believed to bring plenty to the household that keeps it' (Gorovei 1995: 296).

Apparently sacral salt is also produced during the celebration of St. Andrew's (November 30th) by disenchantment or by wrapping the salt in a cloth and burying it under the doorstep of the cowshed. On the celebration of St. George's (April 23rd) the sacral salt is dug out, mixed with bran and fed to the cattle as a protection from wolves, spells and all evil (Olinescu 2004: 318). The practice of putting salt on the doorstep of an animal shed is present in traditions of the southern Slavs (Ciaușanu 2001: 229-230).

In Dâmbovița new forms of salt consecration have been recorded similar to those previously mentioned during St. Andrew's and Christmas Eve, including more documentation of details about the sacralisation of salt on Whitsuntide (Fochi 1976: 40). '*Călușarii*' perform their dance, disenchanting salt, wormwood, and garlic used by villagers to cure disease (Fochi 1976: 47). Whitsuntide is a holiday derived from that of '*Sîntoader*' (St. Toader/Teodor's day), which has an important role in banishing evil spirits, '*Ielele*' (wicked fairies), and taming the spirits of the dead (Budiș 1998: 98-100; Ghinoiu 1988: 241; 270-279).

In Suceava, another form of the ritual was recorded that reflects the influence of Christianity. During the church service on St. George's day bread and salt are consecrated and afterwards fed to animals to protect them (Budiș 1998: 82-84).

Salt in protection rituals for inhabited spaces or households

Springtime is thought to be the best season to perform protection rituals for crops, gardens and backyards (Știucă 2014: 148-152). Therefore, salt is used in a variety of apotropaic rituals, some against bad spirits. The purpose is to protect the realm of the living and to influence the future at the beginning of a new vegetal life cycle. According to the agrarian calendar, the New Year started on the 9th of March, the date set for the vernal equinox in the Julian calendar, and the cold season was set to start with the autumnal equinox, between the 8th and 14th of September (Ghinoiu 1988: 183-185; 197-207).

In Dâmbovița, in some of these protection rituals, though unrecorded, salt is consumed on specific dates in order to ward off all evil: on March 9th, Shrovetide or Shrove Tuesday, or the 40 Saints' Day; on March 17th, the feast of St. Alexe; or on March 25th, Lady Day or Feast of the Annunciation.

On the first day of ploughing, the same day of the 40 Saints' feast, a series of rituals for crop protection are performed (Marian 1899: 171-179). In Bucovina, in many villages, the lady of the house used to go three times around the plough brought out in the middle of the courtyard. She always walked in the direction of the sun holding in one hand a pot with a bunch of basil, and in the other a pot with incense, a piece of wheat bread or maize flour and salt. The ploughmen and the oxen were incensed, sprinkled with holy water and disenchanted: 'As pure as/ The incense is/ And is the holy water too/ So you walk straight/ Never to get into/ A ghost or a wraith/ to harm you,' or another incantation: 'As no evil can get near/ The incense and the holy water/ So/ no evil shall get close/ To plough land/ To the seed/ To animals.' The bread and some of the salt are fed to the ploughmen and the oxen; the pot with the incense and the hatchet are laid down so that the ploughmen and the oxen can step over them (Marian 1899: 173-176).

Protection rituals for gardens, orchards, courtyards, and for domestic animals against insects, wild beasts or serpents are performed by fumigation on the feast

of St. Alexe, March 17th (Marian 1899: 201-207). Among these rituals, the one in Bucovina consisted of bread, salt, or flour, mixed with water or shattered glass, and coal being deposited at the roots of a common elder plant as food for insects (Marian 1899: 206). With the same purpose of protection against bad spirits, those rituals that had not been performed on the feast of St. Alexe could be done on the 25th of March, on Lady Day or Day of the Annunciation (Marian 1899: 221-227). In the same region, some women used to make a fire in front of the door and place next to it bread, salt and a pot of water. The women said the fire and the water were for angels, but the bread and the salt were given as charity to the poor (Marian 1899: 225-226).

Salt in the protection rituals for cultures and newborn children

In Transylvania, a ritual for agricultural protection ritual was to place on a planted field a bag of wheat seeds, bran, garlic and salt (Pop 1989: 17-18). The same amulet was used in the protection rituals of newborn children during the first bath or the bath after the baptism. The similarity between the two rituals is found in popular beliefs that both the periods between the ploughing and sowing time to germination, respectively from the act of procreation to the birth of a child, are considered the same and subject to many interdictions and magical rituals meant to protect the grain or the baby in this early period of life.

In regard to family traditions, the period from pregnancy to birth and the first stage of the baby's life was thought to be protected through people with a magical-medical role (midwife, godparents). These traditions are reinforced with circumstantial antidotes (charms, disenchantments, magical practices) or more tangible ones ('the tort of knowledge,' incensed amulets, garlic, wheat, salt, basil, holy books) (Știucă 2001: 41).

An important moment in the social integration of the newborn baby is the first bath. Nothing is left to chance. The custom consisted of bathing the baby in water to which salt and a broken egg had been added, so that the baby would not be scalded and would grow to be healthy (Gorovei 1915: 297). The salt in the water could also signify that the baby would be protected from spells or imprecations (Știucă 2001: 175; Mesnil 1997: 91-92). After the bath the baby was swaddled, and as a protection amulet, onto the blanket was attached a bag containing three cloves of garlic, three grains of pepper, three of vernal wheat, three of autumnal wheat, three of incense, three cubes of salt, three chunks of bread and three pieces of the placenta (Ciaușanu 2001: 194; Gorovei 1976: 257), or just bread and salt (Gorovei 1915: 29). The salt, pepper, and the incense are considered antidotes against bad spirits, while the wheat and the bread imply wealth, joy, abundance, fertility, purity, and hope (Știucă 2001: 177; Văduva 1996: 56-68).

The use of amulets containing salt and bread or salt, wheat grains, and a coin is also encountered in German, Bulgarian, and Greek traditions (Ciaușanu 2001: 229-231).

Another crucial moment in the baby's life is the coming of the Fates ('*Ursitoare*'), an event seen as a possible interference or communication between the Human and the Cosmos (Știucă 2001: 118-123). In Dâmbovița, the presence of salt during the Fates' supper is considered an offering (informants E. Cotelea; E. Diaconu). In this sense, fate is, from the human perspective, either individual or collective, the confirmation, acceptance or integration of the newborn's existence into the sacred forces, which can be positive or negative. Whether the '*Ursitoare*' are favourable or not depends on the behaviour of the actors, especially in respecting and performing the magical and ceremonial rites. Similar rites for taming the '*Ursitoare*' are also found in Transylvania, Banat, or Moldavia (Gorovei 1976: 261-262; Pamfile 2008b: 88-90; Văduva 1996: 198-200).

In a Bucovina ritual, the midwife would place the baptized baby on the table close to a loaf of bread and a small pile of salt (Marian 1995: 123). This ritual ensures luck and wealth for the baby. It is considered that this ritual was related to local occupations, mainly sheep farming. It is also possible that the act of placing the baby on salt, bread, on a book and a pencil, on flowers and a mirror can be interpreted as an act of consecrating the newborn child (Știucă 2001: 177).

During this period so full of perils for the newborn, the midwife plays an important role. For example, she is the one who, giving the baby to his mother after the baptism, recites the following incantation: 'Here woman, take this child/ Whom I baptized/ And Christianized/ And gave him the law/ I, him to you I give/ Along with bread and salt/ And the gift of his holiness/ Here, raise him well and healthy' (Olinescu 2004: 179). A similar practice occurs in Bucovina (Marian 1995: 123). The practice of the midwife handing over the baptized newborn to the mother along with bread and salt is also present in Armenian traditions, where salt signifies wealth and luck (Ciaușanu 2001: 228).

N. A. Știucă (2001: 149-150) rightfully assesses that these various gestures are related to the first stage of a new life, of which we focus only those using salt, and should be considered as personal interpretations of rites of passage. Generally, some practices are meant to protect the child from illness and spells, others to alleviate growing-up, some bring wealth, some assure

the social status of the child or relations with other people, their physical appearance and moral conduct. All of these are forms of influencing and moulding the existence of the newborn.

It is in this context that the practices of 'salting' the baby (rubbing salt on the baby's body, bathing him in water with salt, salt placed on the tongue) is also confirmed by others (Ciaușanu 2001: 231; Monah 2008), to be based on ancient traditions, as explained by M. Mesnil (1997: 91-92). According to medieval conceptions, salt was the universal panacea against the Devil and the 'salting,' the ritual 'baking' of newborns ensured their normal cultural integration. From the culinary perspective, unsalted food was considered to belong to a non-human cuisine, reserved for beings from the underworld.

Salt in protection rituals for pigs and their meat

Salt is used with practical and magical purposes during the sacrificial ritual of pigs on St. Ignacio (Theophorus) Day (20th December) (Ghinoiu 1988: 123-127; Știucă 2014: 43-46; Văduva 1996: 159-165).

As in many other places, in Dâmbovița, after the pig's throat was cut, a cross was incised on the forehead of the animal and sprinkled with salt or a mix of salt and corn flour followed by the blessing, 'Enjoy it in good health!' (informants L.Chiorniță; E. Cotelea; A. Eremia; M. Năstase, and Băncilă 2008: 194). In contrast to the ritual in which the pork is marked, pork rind often is rubbed with corn flour and salt to tenderize the meat (informant E. Cotelea). This has an obvious practical purpose, while the incision and salt sprinkling ritual has a symbolical meaning. These old pre-Christian traditions (Ghinoiu 1988: 123-127; Știucă 2014: 43-46; Văduva 1996: 159-165) were deciphered by A. Gorovei (1915: 280) as the popular saying 'may God receive this meat and it not spoil' when some pork was offered as almsgiving, a tradition that can be traced back to Roman times when salt and barley were sprinkled on the forehead of the sacrificed animal in the name of '*Lares,*' the Roman household gods (Văduva 1996: 164).

It is also noted that in Moldavia it is believed that giving as alms a bowl of flour and a clamp of salt would keep the remaining pigs safe from illness (Gorovei 1915: 280). These practices of protecting the meat of the sacrificed animal and the entire drove of pigs reveal the importance of this animal in the alimentation of peasants and, at the same time, an historical persistency from a pre-Christian era in which the head of the pig was identified with the spirit of the wheat (Ghinoiu 1988: 127; Văduva 1996: 162-163). It is also mentioned that people thought that the salt from the forehead incision was effective in curing fever (Gorovei 1915: 296).

Salt in the rituals for the consecration of space

Another kind of protective ritual concerns the consecration of the living space. In Dâmbovița a few forms of these rituals are documented. For example, the informant A. Eremia asserted that 'salt should be sprinkled on the place of the future construction of a house in order to ensure the family wealth and plenty.' The assertion of the informant C. Tîncu is similar: 'One must always make sure that salt is not missing from the blessing ceremony of a house, nor the festive supper following the house consecration.'

Although these practices are somewhat rare, they are nonetheless present in all areas inhabited by Romanians (Budiș 1998: 52; 80-85). It is interesting to note that during the blessing ceremony of a new house, called '*dezlegare*' ('untying') or '*slobozire*' ('liberation'), in order to free the new construction from malefic spirits and their possible adverse consequences, the following objects are placed on a table: holy water, a lighted candle, wheat or corn grains, an egg, and a feather. The same gifts are also mentioned to be placed at the foundations of a house, in the water of the first bathing of a new born child, or at Fates' supper as 'signs of wealth' (Budiș 1998: 60). On New Year's Eve a custom requires that money and some salt be placed on a table to ensure the prosperity of the household for the coming year (informant C. Tîncu). This is an augural practice designed to obtain the benevolence, the fulfilling of wishes or future goodwill of deities through alimentary or non-alimentary gifts (Văduva 1997: 108-116).

Salt in magic practices of purification

Salt is also used in purification rituals, for maintaining health or in sympathy charms. Although in Dâmbovița no such practices are recorded, they are recorded in other Romanian areas. In Vâlcea, in order to purify the place after the death of a family member, a slice of bread, a pinch of salt, a glass of wine, and a tuft of greasy wool were left one night on the bed in which the dead person laid then released in a river on the following morning (Gorovei 1915: 211).

Salt in rituals for preserving beauty or health and for performing the witch's curse of 'removing ugliness'

In many Romanian regions, on Saint George's and Saint Toader/Teodor's days it is usual to clean oneself with dew or to splash people with water (Marian 1901: 276-281) in order to stay healthy or safe from all evil, in addition to washing one's hair or some other magical acts to be beautiful and charming.

The Christian Saint George or Saint Gheorghe overlap an Indo-European pastoral deity, protector of horses

and animals that produce milk, and also with a vegetal deity, protector of sowed fields, called '*Sângiorz*', a compressed name of the Christian saint, but sending more to the pre-Christian practices supposed to be done on that specific day. In many ways it is similar to '*Sântoader*' (the compressed name of Saint Toader/ Teodor, celebrated on the church on the first Saturday from the Lent), making reference to practices from the first week of the Lent, and especially to the horses of '*Sântoader*' which have in charge to guard the Sun not to escape on west and let the human kind on dark. Both of them are young, hippo-morph deities (always represented on horseback), with a role in purifying a place and opening the summer season (Ghinoiu 1997: 172-173).

In Bucovina, at dawn on the 23rd of April, young women used to go to a river with bread and salt to recite the following charm: 'Clean, flowing water/ I offer bread and salt, / But I expect instead to be cleaned by you/ Of hate/ Of curse/ Of public damnation/ Or incantation./ Of any spells/ Or detestation/ Of my hand or leg/ So that I become again like a flower/ A beautiful flower/ Smelled by everybody' ('*Apă curat-curgătoare!/ Eu* îți *dau pâne* și *sare,/ Iar tu curățește-mă:/ De ură/ De gură/* Și *de făcătură/ De strigări/ De căscări/* Și *de orice aruncări;/ Curăță-mă de orice uri/* Și *de orice făcături/ De pe mână, de pe picioare,/ Să rămân eu ca o floare,/ Ca o floricea frumoasă/ Pe care toți o mirosă!*') (Marian 1901: 277-278). In Hațeg, on the celebration of '*Sântoader'* (in the first week of Lent, young girls used to offer gifts to the saint followed by the message: 'You Saint Toader/ Make the hair of girls grow long/ Long as the tail of a mare/ I offer you salt and bread/ You offer us great hair/ I offer you bread and nuts/ you give us some sweet lips' ('*Toadere, Sân Toadere/ Crească chica fetelor/ Cât codița iepelor/ Eu* îți *dau pită cu sare/ Tu să ne dai o chică mare/ Eu* îți *dau pită* și *nuci/ Tu să ne aduci buze dulci*') (Văduva 1997: 110).

In these practices the mineral is offered as alms. It is given along with bread, sometimes replacing the egg, especially in magical-therapeutic rituals for healing or maintaining beauty. These offerings are considered a payment for the land on which these healing plants grew or a reward for the beneficial proprieties of the herbs.

These assertions are supported by records such as: '... the one [usually a woman] who digs looking for the deadly nightshade (*Atropa belladonna*) must do so with a gift of bread and salt and before she starts digging, she must recite the following spell: 'Belladonna, Great Milady/ I give you bread and salt/ You give me the cure for [the name of the person in need of the cure]/ Against pain caused by them/ For backache/ Or for fever [or the name of another illness],' killing the disease. Then she pulls out the plant from the ground and replaces it with the bread and the salt' *('cel ce are a săpa mătrăguna se duce la dânsa cu dar de pâine* și *sare* și, înainte *de a săpa zice: 'Mătrăgună, Doamnă mare/ Eu te dăruiesc cu pâine* și *sare/* și *tu să-mi dăruiești leac lui X/ de durere de Dânsele, ori de durere de* șele*, ori de friguri (cum e boala)', omorând boala suferindului. Apoi sapă buruiana* și în *locul ei lasă pâinea* și *sarea.'* (Candrea 2001: 31-33).

The ethnographic inquiries provide more detail about the time, purpose and modality of collecting the medicinal herbs or those supposed to possess magical qualities. There is more than one period of time suitable for collecting the plants, around the vernal equinox (in the Week of the '*Sântoader*' Horses, Palm Sunday, '*Sângiorz*'), the summer solstice ('*Sânziene*', '*Circovii de vară*' etc), or at autumnal equinox (Assumption of the Virgin Mary, The birth of the Virgin Mary, etc.) (Ghinoiu 2003: 255).

For example, in the Friday of the '*Sântoader*' horses' week, dedicated to all kinds of purification rituals, during the beginning of the growing season, one may dig up the roots of elecampane (*Inula helenicum*) (known under several names in Romania such as '*iarbă mare*', '*homan*', '*holman*', '*oman*'), used by young girls to wash their hair (Ghinoiu 1988: 192-194; Ghinoiu 1997: 236). In other areas this plant was replaced with asarabacca (*Asarum europaeum*). The digging followed a specific ritual, similar to the one used to collect the nightshade. The girl, unwashed and hungry had to leave before dawn, find a place unscratched by poultry, and whisper the incantation 'Asarabacca, Asarabacca/ I offer you bread and salt/ you offer me great braids!' ('*Popelnice, popelnice,/ Eu* îți *dau pită cu sare,/ Tu să-mi dai cosită mare!*') (Apolzan 1982-1983; 703-705; 718; Ghinoiu 1988: 194; Olteanu 1998: 189; 196). She had to fill the hole from where she dug the plant with salt, wheat grains, and wheat flour (Fochi 1976: 312). These practices relate to a symbolic exchange between the vegetal realm and the human realm, between the asarabacca and the girl who wanted long hair such that she needed to offer payment to the place where the plant grew. This exchange may also be interpreted as an alimentary counter-gift offered to Mother Earth, the pre-Christian deity (Candrea 2001: 33; Văduva 1997: 116-117), or a gift for the '*Iele*' (wicked fairies) known for their revengefulness and as patrons of the healing herbs (Olteanu 1998: 188-189). In other ethnographic recordings the same exchange of bread and salt is mentioned in the case of English mandrake (*Bryania dioica*), lesser celandine (*Ficaria ranunculoides*) (Marian 1901: 217) or elderwort (*Sambucus ebulus*) (Candrea 2001: 31-35). It is important to note that the rituals of collecting the healing herbs were dictated by the purpose, or the future use of the plant, so there are some differences when collected for rituals of love, success or revenge (Candrea 2001: 31-37).

In the treatment of hand and leg illness we noticed the practice of offering bread and salt in a river while

whispering: 'Flowing water/ I command you/ In exchange for bread and salt/ Cure [someone]/ From top to toe' ('*Apă curgătoare, /Eu te sorocesc/ Cu pâine* și *sare/ Să lecuiești pe cutare/ Din cap până* în *picioare*' (Candrea 1999: 394). A hypothesis has been advanced (Candrea 1999: 396) that certain disease or illness can be cured by the ritual act of throwing offerings into a stream through an intermediary, in this case the bread and salt. The illness goes away, never to return, like the flowing water that cannot return to its origin, but this could also be interpreted as a reward to the water pixies for the favour (Ciaușanu 2007: 158; Olinescu 2004: 332-334).

And the practice of 'removing the ugliness' was described in Banat to occur on '*Sântoader*' day, when it is considered time to clean the beehives. Women used to bake rolls of bread using wheat flour from two different households. The honey was used to dab young girls, and the block of salt which has been carried inside a hem from one Tuesday to the other are disenchanted and mixed in the meal of both the husband and the mother-in-law (Marian 1899: 88-89).

Salt in rituals for rewarding persons who possess magical powers

Payment or reward for warding off an enemy spirit is also represented by the night-time practice of a woman whose child has been crying for a long time, a condition considered to be sent by a demonic creature, '*Muma Pădurii*' (Mother of the Forest) or by other invidious mothers. The woman should throw some bread and salt or bread, salt and wine towards a light source in the house, at the same time asking for the child's insomnia to leave (Candrea 1999: 385-386).

The practice of giving rewards of salt and bread to deities, saints or other mythological beings it is also documented for magical people, for example, a midwife or female weavers. The midwife was rewarded a handful of flour and salt that had been previously passed over the baby so that he or she would quickly grow strong (Gorovei 1915: 30). In case the midwife was not rewarded 'at least some flour and salt,' this character full of magical powers could replace the baby in collaboration with the devil (Olteanu 1997: 68-71).

Salt in rites of passage

There are other Romanian traditions that are based on salt as an offering. In this sense, we mention the testimony of S. F. Marian (1890: 368), who attested that in Bucovina at the end of the nineteenth century, the meal given at the celebration of an engagement consisted only of bread and salt. Salt is also used in other nuptial rituals. For example, during the meal given after the marriage ceremony, repeated orations remind the companions that the bread and salt are gifts from god ('...Here, take this bread and salt/ Gifts from His Holiness/ Our God') (Marian 1890: 655). The same gesture was performed at the christening ceremony in Bucovina. The godmother passes the child to the mother with these words: 'Here mother, take the godson/ Along with bread and salt/ As a gift from His Holiness. / I bathed him/ I washed him/ I clothed him/ and made him pretty/ Here, take him/ Raise him well/ in good luck, in good health/May he live a long life' (Gorovei 1976: 285).

We conclude that the presence of salt at these important moments in people's lives (baptism, engagement, wedding) is required to place the child or the new family under good auspices.

Salt in practices of divination

Salt has been used as a catalyst in various rituals related to prophecies and for influencing the future. It has also been used in forecasts, for taming fate, and for finding out the sex of an unborn child.

In forecasts, salt was used in the following way: on the night of the New Year salt is placed in twelve half-onions. By the amount of liquid accumulation, it was possible to determine the rainy months (E. Cotelea, E. Diaconu). This practice has been recorded in the town of Pucioasa (Bostan 2011: 55) and also in the northern parts of Moldavia (Marian 1898: 90; Niculică-Voronca 1998: 107). It is believed that the moistening of the salt in its container brings rainy weather (informants A. Eremia; C. Tîncu). This popular belief was also recorded in Băsești and Potlogi (Bostan 2011: 76).

For determining the sex of a fetus, after the fourth month of pregnancy, salt is sprinkled on the top of the head of the pregnant woman. This is done without her knowing it. If she, after touching her head, puts her hand to the nose, then the fetus will be a boy, but if she touches her chin, then it will be a girl. A variation of this belief is that the father discretely places some salt on the head of his wife and, if she scratches her head, then they will have a boy. These beliefs have been recorded in Șotânga (Bostan 2011: 37-38), also mentioned in Vișina (informant D. Diaconu), and in the locality of Văcărești (informant L. Chirniță). At the beginning of the twentieth century, the first of these practices has also been recorded in the northern parts of Moldavia (Gorovei 1915: 295; Niculiță-Voronca 1998: 155).

There are numerous actions dedicated to finding one's future spouse that can be performed at different times of the year. One practiced in Dâmbovița consists of many girls gathering in one place. On a table they place pots, cups and such, under which they hide different objects: money, a mirror, a comb, coal, salt, etc. Each girl, blindfolded, picks up one object and, depending

on what she picks up, interprets what her foreordained husband will be like. If she picks up the mirror, he will be handsome; if the money, he will be rich; if the pencil, he will be erudite; if the coal, he will have dark hair; if the salt, he will be poor; if the comb, he will be ugly. This ritual was recorded in the village of Podu Rizii (Bostan 2011: 53) and in the village of Bucșani (Băncilă 2008: 190). A similar ritual was recorded by S. F. Marian (1898: 189), this time performed by boys on Twelfth tide day. In this case, salt symbolizes a long life, but in other variants salt signifies wealth (Fochi 1976: 253).

In Bucovina and Moldavia were recorded various divinatory practices of fate (Marian 1898: 75-76) and for attracting one's future husband (Marian 1898: 142; Marian 1901: 272-273; Niculiță-Voronca 1998: 156). These practices recorded in the early twentieth century all included bread and salt.

The use of salt by young girls during the divinatory practices on *St. Vasile*, Twelfth tide or *St. George*'s celebrations can be interpreted as transference of the qualities of salt – its limpidity and purity, both needed to practice rituals for the amplification of vital forces, of attraction (Văduva 1996: 41). In a broader sense, in the popular pre-Christian mythology, these divinations based on salt are considered possible due to the mineral's communicative ability to connect two worlds – the salted medium (human) and non-salted (non-human) (Olteanu 1999: 358).

Salt in magic practices of healing

An important chapter of folklore belongs to disenchantments, part of curative magic. It is a vast domain, in which many magical elements are involved; nonetheless we can only review some of the practices involving salt as a remedy or disenchantments containing salt, recorded in the villages of the county of Dâmbovița.

Disenchantment for anthrax (in Romanian 'dalac')

'*Dalac*' or '*Dălac*' is a word of ancient Slavonic origin, also found in Bulgarian or Serbian languages, meaning anthrax, black boo-boo, coal or malignant pustules. It is a bovine contagious disease, also transmittable to humans, which manifests itself by pulmonary or gastrointestinal abscesses and vertigo (Candrea 1999: 239; DEX).

> 'Out of my life black boo-boo!/ Go into the desert,/ To places of charmed butterweeds/ Where frogs shriek/ And snails creep./ Run quickly where the frog jumps not over its head,/ But to my horned cow,/ To its tail, to its udder/ You do not come./ Go into a hollow of a tree/ Your new forever shelter/ Sprinkled with salt/ And so my cattle be safe of you.' ('*Ieși dălac din viața mea! Fugi* în *pustie,/ Pe locuri cu buruieni fermecate/ Ca broasca* țipând,*/ Ca melc târând/ La vita mea cu coarne/* În *coadă,* în *uger să nu vii./ Fugi unde nu sare broasca peste cap,/ Du-te* într-*o scorbură unde* întotdeauna*/ Să-ți folosești culcușul/ Acum* și-ntotdeauna*/ Cu bulgăre de sare/ Ca să nu ai loc de vite.*')
> (recorded in Muscel-Moroieni, in the second half of the twentieth century) (Drăgoescu 2006: 59).

Or in another version of the same disenchantment it is said:

> '*... [Black boo-boo] As salt melts so should you,*
> *And dissipate like dust you too...*'
> (recorded in 1942, in Crângurile de Sus) (Drăgoescu 2006: 50).

Disenchantment for uvula (in Romanian 'guşter')

In Bulgarian, '*gušter*' means throat but in Romanian the term means throat inflammation (DEX), sometimes caused by angina (Candrea 1999: 237).

If a child suffers from quinsy (swollen throat), a wooden spoon dipped in grease and sprinkled with salt is inserted into his throat and the following disenchantment is recited:

> 'Uvule, uvule,/ You left the Țarigrad [Constantinople],/ You came upon [somebody],/ In his head you hopped,/ His throat you choked./ He yelled/ And wailed,/ But The Holy Virgin heard him/ And came to him./ From her pocket/ A wooden spoon she pulled,/ She grabbed it, salted it,/ In the swollen throat inserted it./ Stirring the uvula/ From head to toe./ With salt it was rubbed/ So that it was flayed/ To ashes and dust./ And he who was ill,/ Now cleaned and light-hearted/ Like sun in the sky/ Like dew on a field,/ Clean and light-hearted/ Was left by The Holy Virgin.' ('*Guşter,* înguşterat*,/ Din Tarigrad a plecat,/ Pe cutare a-ntâlnit,/* În *cap i-a sărit,/ In gură i-a intrat,/* În *gât l-a astupat,/* Și *el* țipa*,/* Și *se vâita, /Maica Precista l-auzea, /* Înainte îi *venia,/ Mâna* în *buzunar băga,/ Lingura de lemn scotea/ De coadă o lua,/ Cu sare o săra/* În *gât o băga/ De guşter dedea./* Îl încrâncena*/ De la cap la coadă* îl *lua,/ Cu sare* îl *freca/* Și-*l despuia/ Praf* și *paragină-l făcea/* Și *(cutare) rămânea/ Curat, Luminat, /Ca Steaua din cer/ Cu dinții de fier,/ Ca roua din câmp,/ Curat, Luminat,/ Cum Precista l-a lăsat.*')
> (recorded in 1943, in Potlogi) (Drăgoescu 2006: 92).

Disenchantment for indigestion (in Romanian '<u>aplecat</u>')

> 'Turkish or Hungarian or greedsome indigestion/ Induced by seasick/ Or salt, or food/ Let (someone) /Walk straight on this road/ Not limply but in strength / So he remains pure and bright/ like the silver purified.' ('*Aplecare turcește, porcește, ungurește/*

De-a fi aplecat din mare, /Din sare, din bucate/ Să-l lași pe (cutare)/ Să meargă pe drum/ În *răsăritul soarelui, apusul soarelui/ Fără să-și* înmoaie *picioarele/* Și *să-i iei puterile./ Să rămâie curat* și *luminat/ Ca argintul strecurat*').
(recorded in Moroeni, in the second half of the XXth century) (Drăgoescu 2006: 31-32).

Disenchantments for edema or swelling (in Romanian 'bubă')

The Romanian word '*bubă*' comes from Ukraine and is a general word for all kinds of purulent swellings; for a more precise diagnosis another term is added. The impetigo ('*bube dulci*') refers to the infectious, superficial pustules, usually affecting the mouth or head of children.

In a questionnaire completed by D. Diaconu, the informant mentions a practice in which the informant assisted. A grandmother from the village of Vișina used to treat the stomach flu (*gastro enteritis*) using salt – salt was pinched with three fingers then sprinkled all over the belly, accompanied by the following disenchantment: 'White swelling, black swelling (anthrax)/ Leave the liver/ and the lungs/ Leave the lumbar, the wrist and the crotch/Leave him [someone]/ pure and bright/ As Mother of God created us/ So you swelling got to go/ You're awaited by Saint Mary/ with a square meal, lighted candles/ To give you bread and salt.' Next the grandmother would put some salt on the back of her hand and the child would lick it.

In Dâmbovița there is a reference to a treatment for neuralgia ('*năjit*'), refering to tooth or earache, based on a charm and saltwater (Bostan 2011: 16), but the gestures and the incantation are not detailed.

N. Vătămanu (1970: 129) explained in great detail that neuralgia ('*năjit*') corresponding to a series of otorhinolaryngologic diseases that include catarrh, otitis, trigeminal neuropathy, gingivitis, and toothaches in general, was thought to be induced by an evil spirit that had entered into the patient's head, provoking great pain and ear and nose pus. In Slavic languages, this evil spirit was called '*nejitov*', the antonym for '*jitov*' (to live). Vătămanu specified that in Moldavia, in order to cure the illness, the enchanter had to dissolve salt into water so as it dissolved, the evil spirit left the body. It is mentioned that some pieces of bread spread in salt were manipulated during the ritual.

A semantic analysis of these texts allows us to identify how salt was supposed to act in order to cure the patient. In the angina charm is detailed the therapy meant to increase the efficiency of the treatment, and how salt, with its curative proprieties, will be able to exterminate the evil spirits. In the indigestion charm it is explained that the illness can also be induced by an excessive consumption of salt, contrary to the charm from Visina for swellings, in which salt is both a treatment for the stomach illness and at the same time a food that attracts the sickness. This double value of salt is present in many other enchantments. Another way of fighting the disease was revealed in the carbuncle charm, in which the infection present in animals is sent to a narrow place where a block of salt is present in order to stop the development of the virus. In the charm for uvula or neuralgia the treatment is based on a comparison – as salt is dissolved into water, so does the disease. The salt also becomes a reward, offering or part of a meal in order to lure the illness away from the patient's body.

A. Candrea (1999: 131-134; 236-241) studying beliefs about the origin of illnesses and diseases such as pestilence, epilepsy, cough, pangs, swellings, has pointed out that from the Middle Ages to the beginning of the 20th century, though similar ideas as in Antiquity, people thought that the diseases were the results of devils, bad spirits or demons sent by an enemy using spells, or by God, as a punishment. Therefore, the cure could only be done through exorcism or enchantment.

These enchantments could not be effective unless the sorcerer knew the name of the spirit provoking the disease. Through verbalization of that name, the enchanter could possess or take over the evil spirits becoming able to address them directly, command, threaten and frighten them. These actions are facilitated by the weaknesses of such evil spirits – they are stupid, cowardly or easily frightened by loud noises, and they are mischievous, so the enchanter is able to drive the spirits away from the human or animal body, curing it (Candrea 1999: 146-156).

The use of salt in black magic is rarely recorded, nonetheless A. Gorovei (1915: 296) has noted beliefs in northern Moldavia regarding the sudden death of a person after the administration of even the smallest quantity of salt that had been under a dead person's tongue for three days.

'Salt convention' through the ages

Other traditional practices are local interpretations of what is known as 'salt convention.' I consider this to be related to the ancient custom recorded in Vulcana (Dâmbovița), where important guests were greeted with bread and salt as signs of hospitality (informant E. Diaconu). In Vișina, the informant D. Diaconu told us of the ancient wedding ceremony in which the gifts (money) from the godparents and other guests were raised by the fiddler on a plate with bread and salt. A similar custom was recorded in the region of Huși (Moldavia) (Marian 1890: 676), where the raising of the

wedding gifts was started by godparents putting money and also bread and salt on a plate which was passed to all participants in the event. In Valahia, this great Romanian ethnographer offered the transliteration of the gesture in the ballad called 'The elder' ('*Moșneagul*'): 'Then the godfather stood up/ A clean bowl he chose/ In it bread and salt he put/ Gifts he offered to the newlyweds/ Then he placed it on the table/ So the guests should put inside/ As much as they could' ('*Până nunul se scula/ Vas curat că alegea,/ Pâne, sare-n vas punea, /Dar într-însul arunca/ și pe masă că-l punea,/ Tot nuntașul ca să de/ Cât îl lăsa inima...*') (Marian 2009b: 678). Similar customs were recorded in Transylvania.

The bridegroom's parents used to receive the newly married pair with bread and salt. Or, in a more complex ritual, flowers, bread, salt and some alcoholic drink were placed on a table in the courtyard. The bride would climb on the table and throw wheat seeds in all four corners. After she got down, the mother–in–law would make her circle a bucket of water, after which the bride would pour water for her mother–in-law and godparents to wash their hands (Gorovei 1976: 357).

The origin and the symbolical meaning of receiving guests with bread and salt as explained by M. Mesnil (1997: 203-204) was derived from the tradition of sitting at the table and sharing bread and salt. She placed its linguistic origin in the Slavic world, because the Russian word '*hlebosolit*' (to receive) is formed of the roots '*hleb*' (bread) and '*sol*' (salt). This practice is considered to be the essence of hospitality and at the same time a gesture of communion meant to guarantee that those sharing a meal would become alike, and in this way removing the peril of enmity. O. Văduva (1997: 85-88) shares the same vision.

But this could be the extension of some even older customs, meant for the ancient Hebrews, for whom a friendship was not sealed unless a meal consisting of bread and salt had been shared, called 'salt convention' (Ciaușanu 2001: 228, 229; Văduva 1996: 40). Taking into account the use of salt in Hebrew, Greek and Arabic sacrifices, N. Pane took the interpretation further, considering that salt is 'something you cannot live without,' a substitute for life (Pane 2005: 19). A. Oișteanu (1998: 162) offered another explanation, thinking that the gesture of receiving guests with bread and salt could be a remnant of some magical rituals of crossing boundaries.

The practice of forming a brotherhood of the holy cross must be considered to be another form of 'salt convention.' In the Romanian medieval archives from Valachia and Transylvania from the 15th to the 17th century is mentioned a particular form of selling or bequeathing an estate, so called acts of ('*înfrățirii*' or '*însurățirii pe mosie*' (Cronț 1969: 10-80). From a legal point of view this form of affiliation between two unrelated people was understood to be a peculiar medieval institution with important effects (Cernea, Molcuț 2003: 129-134; Marcu 1980: 502-504). This evolved from the previous form of the brotherhood of the cross (Cronț 1969: 19-29; 32-34; Marcu 1980: 142-143), even though the latter survived throughout the Middle Ages in all three Romanian medieval countries as a form of solidarity and moral relationship (Marcu 1980: 504).

These medieval documents revealed that the rituals of forming fraternities were more frequently based on swearing on the cross, sometimes made of bread, and followed by a ceremonial feast in order to obtain public sapproval (Panaitescu 1964: 181). This medieval tradition of reinforcing a vow using bread and salt, can be seen later in the translated form of the ballad '*Meșterul Manole*' ('Manole the artisan'), where the oath of allegiance to the brotherhood was described as: 'Great oath/ on bread and salt/ and the holy icons' ('*Jurământul mare/ Pe pâine, pe sare/ Pe sfintele icoane*') (Văduva 1996: 60). This ritual of a great vow on the cross, bread and salt was mentioned in the 18th century (Ciobanu 2010: 449), and in the Romanian rural traditions from the beginning of the 20th century, and remains valid for some economic and social agreements.

The oath on bread and salt is also present in the tradition of forming a sodality of young boys and girls ('*prindere de surate sau fârtați*'), interpreted as a rite of passage. In Transylvania and Banat the ritual is performed on St. Toader's holiday, when young boys vow while holding hands on bread and salt: 'I shall be your brother/ Till the day I die/ I'd better give up the bread and the salt/ Than to leave you, brother' ('*Eu ti-oi fi frate, /Până la moarte,/ M-oi lăsa de pâine/ Și de sare, mai bine/ Decât să mă las de tine*') (Marian 1899: 85). In another ritual, the godfathers of the girls who have decided to become sisters, had to sprinkle a spoon of salt on a special bread baked for that occasion and shared by the girls. This ritual called '*Mătcalău*' (considered the little brother of Easter) ended in an oath: 'Virgin Mary, please help us/ Give us health and good luck!' (Marian 1901: 189-192). This form of consecrating the salt by sprinkling it on bread probably has its origins in the popular sayings: 'Salt is the hand of God' or 'Salt is justice. The holy salt is the holy justice' (Niculiță-Voronca 1998: 153). In Dâmbovița County we could not find any records of such practices of sealing fraternities or any bond through the symbolism of bread and salt.

Salt and interdictions or behavioral rules

A large portion of popular beliefs consist of multiple interdictions, or taboos. Although today these are perceived as superstitions, their analysis has in fact proven that salt has been for the traditional household

a symbol for wealth and prosperity, the *manna* of the household.

In Dâmbovița we encountered a series of rules that demonstrate the importance of salt in folklore. One maxim says: 'Don't overboil the milk or the udder of the cow will be affected; in order to prevent that spread salt on the fire' (Bostan 2011: 50). Another one says: 'Never lend salt on Mondays and Fridays because you affect the manna of the household' (informant E. Cotelea, also recorded in a similar variation by Bostan 2011: 71). In the northern parts of Moldavia, it is said:'No salt should be given away on Mondays because there will be marital quarrels all week' (Niculiță-Voronca 1998: 155). In Valea Lungă (Dâmbovița) it was recorded : 'One should never lend salt or pepper because the manna of the household is given away' (Bostan 2011). A Moldavian variation says: 'If one has dropped the pepper box, salt must be sprinkled at once in order to avoid marital quarrels' (Niculiță-Voronca 1998: 155).

Some versions of these rules and customs, documented in the northern parts of Moldavia at the end of the 19th century, allowed us to understand the beliefs behind these norms: 'To steal a household's saltis to take away the peace and prosperity of that house' ('*Sare dacă furi de la o casă, ai luat dulceața, ai luat folosul din casă.*'); or, 'If someone steals salt from the cow barn, you will have some loss, but if the salt is stolen from the sheepfold, you will lose them all' ('*Sare dacă-ți fură de la vite, pot muri toate; e pricaz, îți face între vite rău. Ori de la oi de fură sare, sînt duse toate*'); or, 'Stealing salt is a sin, because it is the same as the (holy) bread. If you steal it, you attract witchcraft because it can't be salt without bread and bread without salt' ('*Sare e tare păcat a fura, că ea una cu pâinea merge. Dacă furi sare nu e bine în casă, căci sarea nu poate fără pâine și pâinea fără sare*'); or, 'In Broscăuti, near the village of Mihalcea, if someone borrows salt, they are very careful to pay it back with interest, otherwise they will come to harm later' ('În Broscăuți, lângă Mihalcea, tare se păzesc, când împrumută sare, ca să *deie mai mult înapoi, să nu le strice pe urmă*'); or, 'I would be happy if someone stole salt from me because they'd go home empty handed while I'd take all of their prosperity' ('*Ba eu aș vrea să-mi fure cineva din sare, că de acela nu se alega nimic și mie îmi merge atunci bine*'). Another example: 'If someone stole salt or something else from you, producing loss, you just give them salt and bread; their life will become useless. There's not even a need for a compensation ('*Dacă ți-a furat cineva din sare or altceva, ți-a făcut pricaz; ia și-i dă aceluia pîne și sare, că nici liturghie la biserică nu trebuie să dai ; și nu se mai alege nimica de capul lui*') (Niculiță Voronca 1998: 153).

Unlike this first series of interdictions which we believe to be older, the next series appeared after industrialization and lowersalt prices: 'If one takes their own food to work but there are leftovers, they should not bring home the salt; it's sign of poverty' (Bostan 2011: 50); or, 'Once out of the house, the salt should not be brought back; it's bad luck' (informant C. Tîncu).

When spilled, salt brings bad luck or a quarrel and, in the case of children, punishment from parents (informants E. Cotelea, C. Tîncu). The remedy consists of three pinches of the spilled salt put on the head (E. Cotelea). Variants of this practice were recorded in Priseaca, Gura Foii, Mărcești – Dâmbovița County (Bostan 2011: 19; 50).

These superstitions could be explained on two different levels. The first is the interdiction to lend or borrow salt; the second is about the use of salt as a protection, or barrier against enchantments or evil spirits as in the following superstitions: 'If a fire is crackling in a wood stove, someone is backbiting you. The solution – when salt is thrown into a fire, the enemies become silent' (Bostan 2011: 27; informant D. Diaconu); or, 'If you find the visits of someone unbearable, after that person has left your house, sprinkle some salt on the doorstep and that person should not return for some time' (informant C. Tîncu); or, 'Sprinkle salt under the doormat to keep away the spells and evil spirits' (informant L. Chiorniță); or, 'The entrances in the house must be sprinkled with sacred salt as protection against enchantments' (informant F. Petrescu). These last ones demonstrate that the salt is sacred; it has magical properties that can protect the household against witchcraft and spells (Olteanu 1999: 352-358; Văduva 1996: 40).

Another interdiction recorded in Dâmbovița states that in case of rain on a wedding day, the old women cooks send the bride to throw salt into a fire in order to stop the rain (informant l. Chiorniță). This norm could be explained by the beliefs of the southern Slavs who thought that storms and hails are sent by evil spirits or by witches, for whom the most unpleasant gift was salt (Ciaușanu 2001: 175; 178); or, according to Romanian beliefs, the rain and clouds are carried by dragons (T. Pamfile 2008a: 357-358). Another argument for this statement is the tradition recorded in Vâlcea by Gh. F. Ciaușanu (2001: 156) that, when there is a downpour of rain, it is customary to sacrifice salt in a fire to stop the rain. The same purpose of rewarding the untamed forces of nature corresponds to the custom recorded by A. Fochi (1976: 257): 'in order for the wind to start blowing a reel from a loom was balanced between the legs, then a bowl of salt was placed into a fire.'

In Braniștea and Uliești (Dâmbovița) it is said that 'if one stains his hands with salt in the Holy Week, the hands will sweat abundantly the entire year' (Bostan 2011: 61; informant F. Chiosea). The same belief was recorded in northern Moldavia at the end of the 19th century (Niculiță-Voronca 1998: 155).

Conclusions

The first thing I would like to highlight is the fact that, even if there are several salt sources in the Dâmbovița, the customs and beliefs concerning the manipulation of salt are not inherent in its presence. The uniformity of these practices and behavioral regulations in Dâmbovița and in other parts of Romania, in the last 150 years, suggests that these beliefs are part of a deep historical, collective mentality.

The review and integration of these traditions regarding the use of salt in a larger conceptual framework of traditions, superstitions, interdictions, and aphorisms reveal their double origin - ancient and Christian- both derived from the salt convent, in which salt is a symbol of purity, cleanness, and perfection. Salt is an important element in many apotropaic rituals, often in association with bread, becoming a symbol of harmony, peace, friendship and hospitality, or plays a positive role of mediator between the human and non-human worlds.

The Romanian ethnologists describe salt as a magical presence. According to A. Candrea (1999: 259-270) salt, as well as some metals (iron, mercury/ quicksilver, gold, silver, copper), plants (basil, chicory, rhinantus, lovige, garlic, wormwood, etc.), animals, jewelry, and other magical or religious objects are considered efficient means of protection against evil spirits and witchcraft. These beliefs are common across all European nations.

In time, these things have lost their magical virtues, and today salt is perceived as a symbol of abundance, beauty, and health. This functional mutation from magical to omen has to do with a weakened confidence in the magical forces of objects, substances and gestures, therefore their secondary utilization in more complex rituals (Candrea 1999: 259-270; Știucă 2001: 155-156).

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References

Alexianu, M., Weller, O. and Brigand, R. 2007. *Izvoarele de apă sărată din Moldova subcarpatică. Cercetări etnoarheologice*. Iași, Demiurg.

Alexianu, M., Weller, O. and Curcă, R. G. (eds.) 2011. *Archaeology and Anthropology of Salt. A Diacronic Approch. Proceedings of the International Colloquium 1-5 October 2008, Al. I. Cuza University (Iaşi, România)*. Oxford, Archaeopress, British Archaeological Reports. International Series 2198.

Alexianu, M., Curcă, R. G. and Cotiugă V. (eds.) 2015. *Salt effect. Proceedings of the Second Archeoinvest Symposium, 20-21 April 2012, Iaşi, Romania*. Oxford, Archaeopress, British Archaeological Reports. International Series 2760.

Apolzan, L. 1982-1983. Aspecte ale culturii spirituale. obiceiuri, practici şi simboluri specifice gospodăriei pastoral-agricole din Platforma Luncanilor, jud. Hunedoara. *Sargetia* XVI-XVII: 685-721.

Avram, S. 2005. Sarea – tradiţie, simbol şi ritual. *Angustia. Arheologie-Folclor* 9: 241-244.

Băncilă, I. 2008. *Comuna Bucșani. 555 ani de atestare documentară*. Târgoviște, Bibliotheca.

Bostan, F. 2011. *Credințe și superstiții din județul Dâmbovița*. Târgoviște: Centrul Județean de Cultură Dâmbovița.

Budiș, M. 1998. *Microcosmosul gospodăresc. Practici magice și religioase de apărare*. București, Paideia.

Candrea, I. A. 1999. *Folclorul medical român comparat. Privire generală. Medicina magică.* Iași, Polirom.

Candrea, I. A. 2001. *Iarba fiarelor. Studii de folclor. Din datinile și credințele poporului român*. București, Fundația Națională de Științe și Artă, Academia Română, Institutul de Istoire și Teorie literară 'G. Călinescu'.

Catenescu, N. I. 1940. *Monografia comunei Cîndești a elevului Catanescu N. Ion, Cls. a 6-a, Liceul I. Văcărescu*. Complexul Național Muzeal Curtea Domnească Târgoviște, archives.

Cernea, E. and Molcuț, E. 2003. *Istoria dreptului românesc*. București, Universul juridic.

Ciaușanu, Gh. F. 2001. *Superstițiile poporului român în asemănare cu ale altor popoare vechi și noi*. București, Saeculum.

Ciobanu, D. 2010. Sarea, aliment, conservant şi hrană rituală. *Angustia* 14: 447-450.

Cronț, Gh. 1969. *Instituții medievale românești. Înfrățirea de moșie. Jurătorii*. București, Editura Academiei Republicii Socialiste România.

Dăncuș, M. 2006. Sarea – fragmentarium etnologicum. In V. Cavruc and A. Chiricescu (eds.), *Sarea, Timpul și Omul:* 147-148. Sântul Gheorghe, Angustia.

DEX – Dicționar explicativ al limbii române (https://dexonline.ro/).

Diaconu, R. E. 2013. Sarea in lumea satului traditional – între practică şi simbol. *Anuarul Muzeului etnografic al Moldovei* XII: 231-240. Iași, Palatul Culturii.

Drăgoescu, I. I. 2006. *Antologia descântecului dâmbovițean. Culegeri din teren, arhive, texte publicate*. Târgoviște, Centrul pentru conservarea și promovarea culturii tradiționale Dâmbovița.

Fochi, A. 1976. *Datini* şi *eresuri populare de la sfârşitul secolului al XIX-lea: răspunsuri la chestionarele lui N. Densuşianu*. București, Minerva.

Ghinoiu, I. 1988. *Vîrstele timpului*. București, Meridiane.

Ghinoiu, I. 1997. *Obiceiuri populare de peste an: dicționar.* București, Fundației Culturale Romane.

Ghinoiu, I. 2003. *Sărbători și obiceiuri românești.* București, Elion.

Gorovei, A. 1915. *Credinți și superstiții ale poporului român.* București, Leipzig, Viena, Socer and Pavel Suru, Otto Harrassowitz, Gerald and co.

Gorovei, A. 1976. *Literatură populară*. București, Minerva.

Ilie, A., Olteanu, Gh., Cîrstina, O., Păunaș, A. and Ilie, B. 2013. L'exploitation des sources salées du bassin supérieur de la rivière Ialomița, de l'âge du bronze jusqu'au Ier siècle ap. JC. In C. Schuster, O. Cîrstina, M. Cosac, G. Muratoreanu (eds.) *The Thracians and their Neighbors in the Bronze and Iron Ages, Proceedings of the 12th International Congress of Thracology, Târgoviște, 10th-14th septembrie 2013, Settlements, Forteress, Artefacts:* 183-206. Tîrgoviște, Cetatea de Scaun.

Marcu, L. P. 1980. Înfrățirea. In I. Ceterchi and V. Hanga (eds.), *Istoria dreptului românesc*, I: 502-504. București, Academia Republicii Socialiste România.

Marian, S. F. 1890. *Nunta la români. Studiu istorico-monografic comparat.* București, Carol Göbl.

Marian, S. F. 1898. *Sărbătorile la români, I (Cârneligile).* București, Carol Göbl.

Marian, S. F. 1899. *Sărbătorile la Români, II (Paresimile).* București, Carol Göbl.

Marian, S. F. 1901. *Sărbătorile la români, III (Cinci-decimea).* București, Carol Göbl.

Marian, S. F. 1995. *Nașterea la români. Studiu etnografic.* București, Crai și Suflet – Cultura Națională.

Mesnil, M. 1997. *Etnologul, între* șarpe și *balaur.* București, Paideia.

Monah, D. 2008. O confirmare etnografică a versetului Iezechiel 16/4. Sarea noilor - născuți. In D. Monah, G. Dumitroaia and D. Garvan (eds.), *Sarea de la prezent la trecut:* 117-132. Piatra Neamț, Bibliotheca Memoriae Antiquitatis XX.

Oișteanu, A. 1998. *Mythos & logos. Studii și eseuri de antropologie culturală.* București, Nemira.

Olinescu, M. 2004. *Mitologie românească*. București. 100+1 Gramar.

Olteanu, A. 1998. *Ipostaza ale maleficului*. București, Paideia.

Olteanu, A. 1999. Școala de solomonie. București, Paideia.

Olteanu, A. 2005. Farmece de ursită. Alungarea rivalei în moarte. *ORMA. Review of Ethnological and Historical-Religious Studies 3 (Magia rustică. Imagerie și practici magice în cultura tradițională):* 37-74.

Niculiță-Voronca, E. 1998. *Datinile și credințele poporului român, adunate și așezate în ordine mitologică* I. Iași, Polirom.

Pamfile, T. 2008a. *Mitologia poporului român* I. București, Vestala.

Pamfile, T. 2008b. *Mitologia poporului român* II. București, Vestala.

Panaitescu, P. P. 1964. *Obștea țărănească în Țara Românească și Moldova: orânduirea feudală*. București, Academia Republicii Socialiste România.

Pane, N. 2005. *Folclor literar românesc. Pâinea, vinul* și *sarea. Ospitalitate* și *moarte*. Craiova, Scrisul Românesc.

Pop, D. 1989. *Obiceiurile agrare în tradiția populară românească*. Cluj-Napoca, Dacia.

Popovici, D. N., Cîrstina, O., Ilie, A., Olteanu, G., Năstase, M. and Petrică, F. 2015. Salt sources in Dâmbovița County. Geological, ethnographical, historical and archeological informations. In M. Alexianu, R.-G. Curcă, V. Cotiugă (eds.) *Salt effect. Proceedings of the Second Archeoinvest Symposium, 20-21 April 2012, Iași, Romania*: 207-222. Oxford, Archaeopres British Archaeological Reports. International Series 2760.

Știucă, N. A. 2001. În pragul lumii albe. București, Centrul Național de Conservare și valorificare a tradiției și Creației Populare.

Știucă, N. A. 2014. *Spirala sărbătorilor: rosturi, tâlcuri și deslușiri*. Sibiu, Astra Museum.

Văduva, O. 1996. *Pași spre sacru. Din etnologia alimentației românești*. București, Enciclopedică.

Văduva, O. 1997. *Magia darului*. București, Enciclopedică.

Vătămanu, N. 1970. *Medicină veche românească*. București, Științifică.

Traditional Use of Natural Brine.
Ethnoarchaeological Research in the Subcarpathian Area of Romania

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Abstract

Archaeological evidence confirms that the brine of salt springs from the Subcarpathian area was used to obtain salt, through the evaporation-crystallization processes, as far back as the Early Neolithic. This region is now unique in Europe for its traditional and non-industrial ways of salt water exploitation, still intensively applied. This inestimable scientific resource has been, in the last decade, the subject of extensive ethnoarchaeological research conducted by a Romanian/French team, with impressive results. The paper deals with some results of the ethnographic inquiries, focusing on the traditional ways in which the brine is used in its original state, mainly for preserving different types of food, but also for daily cooking and in preparing feed for animals. The paper also explores the possible implications for the prehistoric archaeology, using the premises of the ancient exploitation of the brine and the (probable) need to conserve aliments like meat, cheese, etc. (with few options available). Therefore, techniques similar to those known today, are highly likely/probable of having been used in prehistoric times, though much more difficult to establish than brine recrystallization.

Keywords: Ethnoarchaeology, salt water springs, Subcarpathian area, food preservation.

Introduction

The archaeological research in the Subcarpathian regions of Romania, corroborated with historical, ethnological and ethnoarchaeological sources provided over the last decades, presents solid information regarding the prehistoric mining of salt rock and the use of brine springs for obtaining salt (Harding and Kavruk 2010; Ursulescu 1977; Weller and Dumitroaia 2005). This has also allowed for a series of hypotheses about the trade of salt, trading routes and various types of goods involved in salt trading etc. Much of this impressive literature is based on the ethnoarchaeological research done in the last two decades, especially by a French/Romanian team (Alexianu et al. 2007; Alexianu and Weller 2007; Alexianu et al. 2008; Weller et al. 2010; Alexianu et al. 2012; Alexianu et al. 2015; Weller and Alexianu 2007; Weller et al. 2007). Since 2007, this work (for the extra-Carpathian area), has been realised under the coordination of Marius Alexianu, through two consecutive grants financed by the Romanian Government (cf. ethnosal.uaic.ro and ethnosal.ro).

The Subcarpathian area of Romania has been characterized by a high density of salt water springs and salt mountains/cliffs (Figure 1/2). This region is now unique in Europe for its traditional, non-industrial methods of salt water exploitation, still intensively applied. This situation presents an ideal framework in which to achieve a complex ethnoarchaeological research.

The ethnologic inquiries made recently referred to: the exploitation and appraisal methods implied, means of transport, containers, distance, frequency, the supply, redistribution, and social organisation, behaviours, trade, ethnoscience, symbolical approach.

In this paper will be highlighted some of the traditional, daily uses of the brine by the inhabitants of the communities near the salt water springs and surroundings. The focus will be mainly on the areas covered by field investigations between 2013 and 2014, namely Buzău and Prahova counties (Figure 1/1). The field work methodology consisted of finding the brine springs, taking measurements and photos, GPS location, followed by ethnoarchaeological inquiries in the closest village/villages (see appendix), based on a standard ethnographic questionnaire.

The brine springs: setups and uses

The salt water springs are exploited differently depending on their salinity, purity, distance and accessibility from the surrounding villages. Generally, the ones outside the settlements, hardly accessible, appear as simple holes dug in the ground, filled with salt water (Bâlca). The only arrangements are some wooden sticks stuck in the ground, intended to support a small recipient (plastic mug, jar) needed to pour the salt water into larger containers (Figure 2). Sometimes, piles of dried, spiky shrubs are arranged around the springs to prevent access by livestock. (Excessive consumption of brine by animals is often deadly).

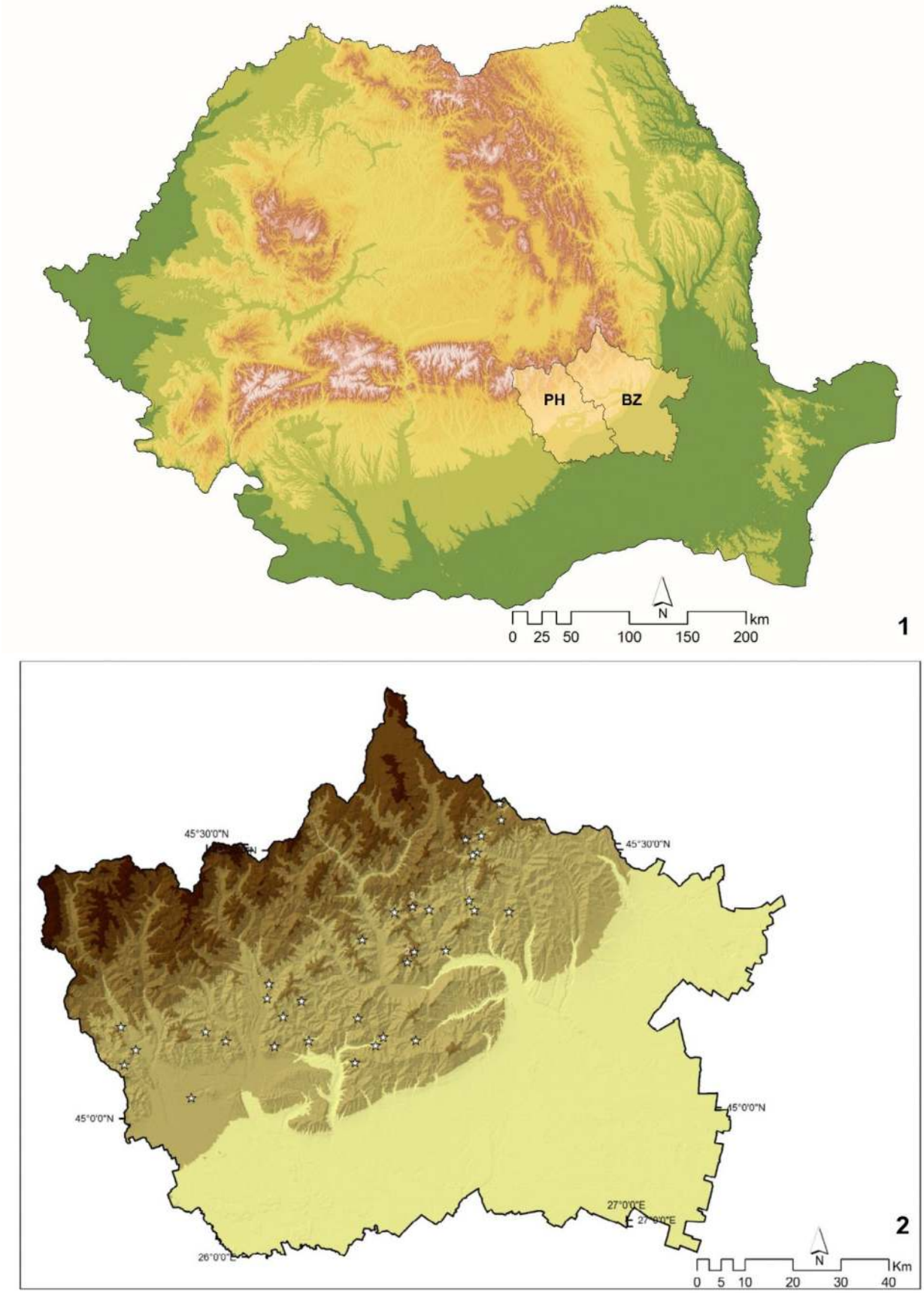

Figure 1. Map of Romania, with highlights on Buzău (BZ) and Prahova (PH) counties (1); the positioning of the salt water springs in the two counties (2).

Figure 2. Salt water springs – simple holes: 1. Bisoca (BZ); 2. Buștea (BZ); 3. Colți (BZ); 4. Apostolache (PH); 5. Cosminele (PH); 6. Mireșul Mic (PH) (photos by the authors).

More frequently, the springs are lightly set up, mostly surrounded with rocks, wooden planks, or captured and channelled via small pipes or grooves for easier utilization (Figure 3).

A third category of salt water springs are the ones usually within the villages, or even cities (or very close, with access from a drivable road), which are more popular and frequently used. These are often set up as fountains, traditionally with hollow tree trunks (buduroi) or, more recently, with concrete or metal tubes or plastic barrels and even large tires. Some springs are captured and channelled with long plastic or metal pipes (Figure 4).

The brine springs are known by the whole community and often by all the inhabitants of the surrounding settlements, even if those have their own spring. Taking brine from the springs is generally allowed for anyone who needs it. The springs are attended on foot, horse-drawn wagon or by car, depending on the accessibility and the needed quantities of brine. Most frequently, the users go to the spring on foot, within a distance varying from a few hundred meters to 4-5km. The users usually carry two plastic containers of 5 to 10 litres each (Figure 5/1-4). Users with horse-drawn wagons take more brine, 100 to 500 litres, used especially for supplying the sheepfolds in the area and for cheese-making (Figure 5/5-8). Quantities up to 1000 litres or

Figure 3. Salt water springs lightly set up: 1. Cănești (BZ); 2. Muscelul Țigan (BZ); 3. Colți – Mățara (BZ); 4. Scăeni (BZ); 5. Negoșina (BZ); 6. Gornetu Cuib (PH) (photos by the authors).

more are transported in large containers by car, mostly for cheese factories.

The most common uses of brine are: for food preservation, for livestock feed, for making table salt through evaporation-crystallization by boiling, for cooking (as it is), and for curative purposes.

Food preservation and cooking

There are three levels of brine consumption: private (household), collective (sheepfolds) and commercial (cheese factories, some bakeries).

The most common use of brine is inside the household for preserving different vegetables, fruits, mushrooms as pickles, making cheese or preserving various types of meat and bacon.

Pickled foods (cucumbers, green tomatoes, cabbage, carrots, plumes, apples, pears, raisins, cauliflowers, small melons and many others) are made especially in the early autumn, today in smaller or large glass or plastic jars or barrels, although formerly in wooden barrels (Figure 6/1-5). The containers are kept over the winter in special still rooms or cellars. For pickles, the concentrated brine is diluted at a one to ten ratio (one litre of brine for 10 litres of common water). Sometimes, the brine is less concentrated, so the ratio will be smaller. Either way, the solution must pass the 'egg test', meaning that a chicken egg must float in it, otherwise, 'you must add more brine until it does'. At

Figure 4. Salt water springs set up as fountains: 1. Beciu (BZ); 2. Ariceștii Zeletin I (PH); 3. Ariceștii Zeletin II (PH); 4. Băicoi (PH); 5. Brebu (PH); 6. Matița (PH) (photos by the authors).

Negoșina (Buzău County), we found an unusual way for making pickles that appears, at least from our current knowledge, to be unique. Green, hard plums are preserved in undiluted brine from the end of June/beginning of July until the early autumn, when the other pickles are made (Figure 6/1-2). Then, they discard this brine and use only the very salted plumes, placed in layers among the other vegetables to be pickled and fresh, unsalty water.

The cheese (*telemea*) is preserved in similar containers, cut in slices, and the brine is usually diluted to a 1 to 4 ratio (Figure 6/6). The use of undiluted brine will make the cheese 'hard as a rock, and you cannot eat it anymore'.

The pure brine is also used for preserving meat (pork, goat or cow) or making pork bacon.

The bacon can be indefinitely left in brine because 'it takes only as much salt as it needs'.

The bacon can be left in brine (jars or barrels), or smoked, and kept as it is. In contrast, the meat is kept only a couple of minutes in brine, because if it absorbs too much salt it can't be eaten anymore.

Some kind of collective use of brine is present through sheepfolds that gather different amounts of sheep from the inhabitants. The shepherds collect all of the milk

Figure 5. Means of transporting salt water from the springs: 1-2. Colți (BZ); 3-4. Drăgăneasa (PH); 5. Bâsceni (BZ); 6. Lunca Frumoasă (BZ); 7. Mânzălești (BZ); 8. Băicoi (PH) (photos by the authors).

Figure 6. Fruits, vegetables and cheese traditionally preserved with salt water from springs (photos by the authors).

Figure 7. Making fine, white table salt by boiling the brine (experiment by F. A. Tencariu).

needed, make the cheese, and distribute it to the sheep owners, according to the number of the animals owned. The brine is procured by the shepherds themselves or by the owners. Commercial use of brine is carried out by cheese factories from Tulcea, Brăila and Constanța (over 100km away), which transport large quantities of brine in barrels. One informant also told us about some city bakeries that commit small frauds by taking large quantities of brine and using it for making bread, instead of buying salt, without informing the customers about the origin of the salt used.

Only a few people informed us that they are using the brine, as it is, for everyday cooking (polenta, borsch and so on). They prefer it to the salt in the stores and know exactly the amount of brine needed for the quantities of food made.

Making solid salt

Over 80% of the informants told us that they themselves, or had seen or heard about making fine, white table salt by boiling the brine, and approximatively 15% are still doing so. This operation was done by putting 5 to 10 litres of brine in a cast iron or aluminium kettle, slowly boiling it until the water evaporates, and sun drying the wet salt left (Figure 7). Some informants told us that this method was used an especially long time ago, when salt was hard to find or too expensive, and today, only the poorest people are still doing it. Others said that they are still doing it, and that produces better salt than that of the market.

Livestock feed

Often the stored, dried hay is sprayed with brine for several reasons: longer preservation (it doesn't get mouldy), it is not spoiled by mice, and is also more readily consumed by the animals. Sometimes, the hay may contain herbs with a bad taste (especially milkweed - *alior*), and the cows won't eat it, so the brine is used to mask this taste. Small quantities of brine are also mixed in the pig swill.

Curative purposes

People use it mainly to alleviate rheumatic pains by keeping their legs in hot brine for a couple of minutes. It is sporadically used for inhalation (steam from the hot brine) as treatment for colds and flu. Two informants told us that they use the brine for treating open wounds (both human and animal – it stops the bleeding and also cleans the wounds).

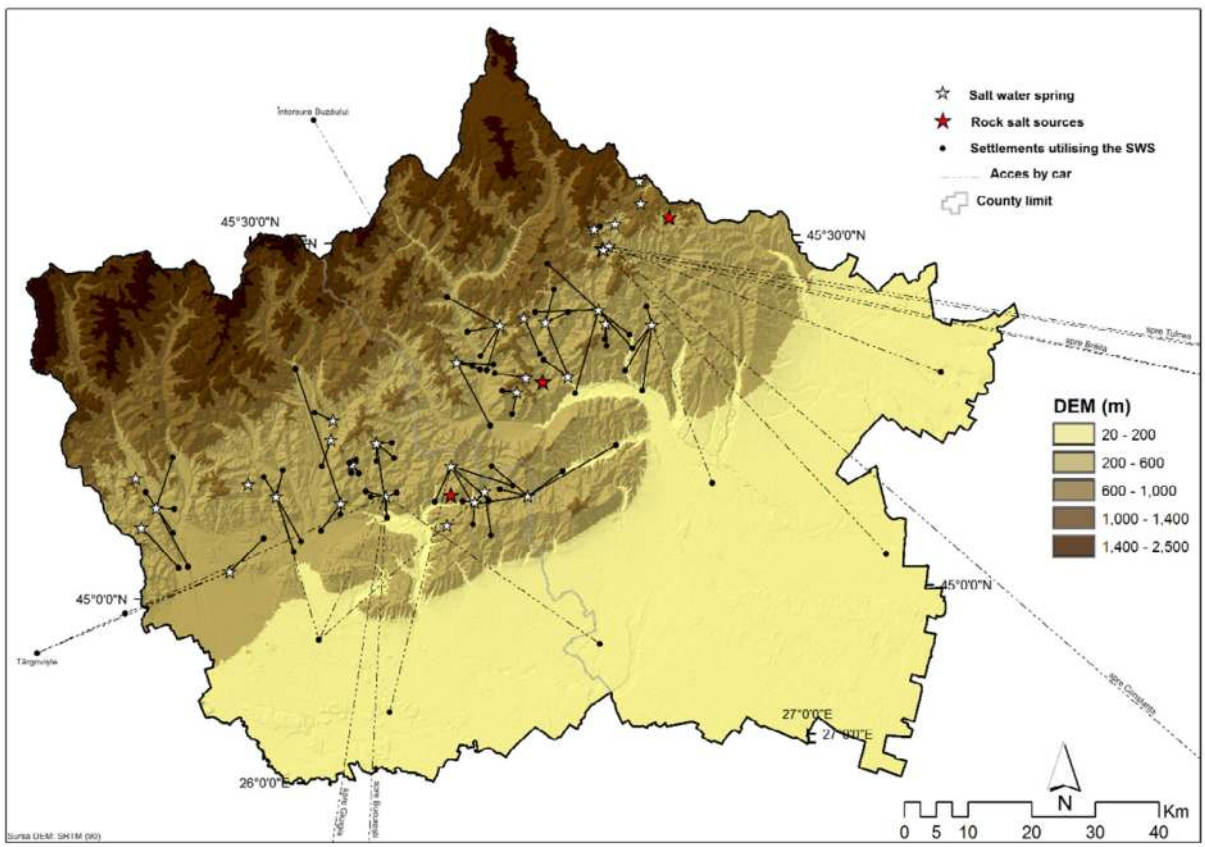

Figure 8. The distribution of the brine from salt water springs; distances and directions to the settlements using the same salt water springs.

Other uses

Among other uses, we should mention pouring brine in some places in the household yard to prevent unwanted growth of grass. Also, rarely, brine is used in cold winters for melting the ice in the yard, but not on concrete, because it destroys it.

Needless to say, even though salt can be bought anywhere and it's very cheap, the natural brine is still intensively used.

Exploitation and distribution

Concerning the frequency of exploitation, the brine springs are usually used less in the spring, experience some use in the summer, and are highly used in the autumn and winter. Almost all the informants told us that in the early autumn, because it is the pickling season, sometimes they have to wait in line to procure brine. The intensity of brine exploitation also increases in the winter before Christmas, when, traditionally, pigs are sacrificed.

For now, we have no information about present or past commercialization of the brine (unlike the rock salt).

We were also interested in the areas of brine distribution, meaning the distances and directions to the settlements using the same salt water springs (Figure 8). According to this, and in addition to gustative characteristics of the brine, flow and purity of the salt water springs, and accessibility to it (by various means of transport, or in the absence thereof), we distinguished three types of springs:

1. Village type, for the springs of strictly local importance, utilized by one to three villages, within a radius of maximum 5km.
2. Communal type, for the springs utilized by more than four villages, within a radius of 5 to 20km.
3. Supra-communal type, in the case of springs used by many settlements (both rural and urban) and whose attraction is exerted over long distances.

Discussion and conclusion

As it is generally accepted, any ethnoarchaeological approach (regardless the subject and geographical area) should be designed and performed as a means to help the archaeological interpretation. In this case, the hypothesis is that, in times when salt was not as available as it is today, but was at least as important for both human and animal consumption, the salt water springs must have been exploited, maybe in ways similar to the ones we have just presented. Of course, one cannot copy/paste situations from the present into the distant past just because there is multiple evidence that people are doing it today and were doing it in the near past (meaning the last three to four hundred years). But, to sustain this hypothesis, we do have other arguments, even if indirect:

1. The brine springs were known, and exploited in prehistory for obtaining salt, as salt crusts, by pouring brine over large bonfires – since Early Neolithic - Lunca – Poiana Slatinei (Weller and Dumitroaia 2005), or as salt cakes by using the briquetage technique in the Early Neolithic – Solca (Suceava County) (Ursulescu 1977) and

Figure 9. Evidence of the use of traditional recipients for transportation and storage of the brine: wooden bucket (1); pottery shards scattered around some salt water springs (2-3) (photos by the authors).

especially during the Chalcolithic - Cacica, Solca (Nicola et al. 2007), Răucești-Munteni, Lunca, Oglinzi (Dumitroaia 1994), Țolici (Dumitroaia et al 2008). From the archaeological evidence, as well as from several experiments with briquetages (Tencariu et al. 2015), it is obvious that this technique implies a considerable effort and large quantities of raw materials (clay, wood, brine). So, at least for the salt cakes, it is likely that these were produced for trade at medium and large distances and not for local consumption.

2. It is obvious that people had the same need, both now and then, to preserve certain types of food: meat, milk (as cheese), and maybe fruits and vegetables.
3. One may argue that, today, people are using plastic recipients to transport and store the brine, but this situation is not older than 20 – 30 years. Previously, almost all informants told us, that the recipients for brine procurement and storage were the same as the ones that could be assumed for the ancient times: wooden buckets (Figure 9/1) and clay pots. At least for the last ones, hundreds of modern ceramic fragments are to be found, just around the springs (Figure 9/2-3).
4. It is common sense to believe that people who were much more connected to nature than we are today were able to know how to benefit from every advantage that the environment provided.

Given these arguments, one can assume, with little chance of being proven wrong, that communities around the salt springs were probably using the natural brine in its natural condition for different domestic activities, in ways not very different than nowadays. However, it is difficult to believe that liquid brine was transportable over large distances for trade. For this purpose, solid salt, powder or cakes, was produced out of the same brine.

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References

Alexianu, M. and Weller, O. 2007. Les recherches ethnoarchéologiques dans la zone de Poiana Slatinei, Lunca: enquêtes en 2004 et premiers résultats. In Monah D., Dumitroaia Gh., Weller O. and Chapman J. (eds), *L'exploitation du sel à travers le temps. Colloque international de Piatra Neamt (Roumanie)* : 299-318. Editura C. Matasă, coll. Bibliotheca Memoriae Antiquitatis, XVIII, Piatra Neamt.

Alexianu, M., Weller, O., Brigand, R. 2007. *Izvoarele de apă sărată din Moldova subcarpatică. Cercetari ethnoarheologice*. Iași, Editura Demiurg.

Alexianu, M., Weller, O., Brigand, R., Curcă R. 2008. Cercetări etnoarheologice asupra izvoarelor de apă sărată din Moldova subcarpatică. *Tyragetia. Arheologie, Istorie Antica* II: 155-177.

Alexianu, M., Weller, O., Brigand, R. and Curcă R.-G. 2012. Ethnoarchéologie des sources salées de la Moldavie précarpatique : une taxonomie des habitats. *Thraco-Dacica* N.S. XI/1-2: 141-150.

Dumitroaia, G. 1994. Depunerile neo-eneolitice de la Lunca şi Oglinzi, judeţul Neamţ. *Memoria Antiquitatis*, XIX: 7-79.

Dumitroaia, G., Munteanu, R., Weller, O., Garvăn, D., Diaconu, V., Brigand, R. 2008. Un nou punct de exploatare a apei sărate în preistorie: Ţolici-Hălăbutoaia, Jud. Neamţ. In D. Monah, G. Dumitroaia and D. Garvăn (eds.), *Sarea de la prezent la trecut*, BMA XX, Piatra Neamţ: 203-224.

Harding, A. and Kavruk, V. 2010. A prehistoric salt production site at Băile Figa, Romania. *Eurasia Antiqua* 16: 131-167.

Nicola, D., Munteanu, R., Garvăn, D., Preoteasa, C., Dumitroaia, G. 2007. Solca-Slatina Mare (Roumanie). Preuves archéologiques de l'exploitation du sel en préhistoire. In D. Monah, Gh. Dumitroaia, O. Weller and J. Chapman (eds.), *L'exploitation du sel à travers le temps* : 35-56. Editura C. Matasă, coll. Bibliotheca Memoriae Antiquitatis, XVIII, Piatra Neamt.

Tencariu, F. A., Alexianu, M., Cotiugă, V., Vasilache, V. and Sandu, I. 2015. Briquetage and salt cakes: an experimental approach of a prehistoric technique. *Journal of Archaeological Science*, 59: 118–131.

Ursulescu, N., 1977. Exploatarea sării din saramură în neoliticul timpuriu, în lumina descoperirilor de la Solca (jud. Suceava). *Studii şi Cercetări de Istorie Veche şi Arheologie*, 28/3: 307-317.

Weller, O. and Dumitroaia, G., 2005. The earliest salt production in the world: an early Neolithic exploitation in Poiana Slatinei-Lunca, Romania. *Antiquity*, 79 (306). (www.antiquity.ac.uk/ProjGall/weller/index.html).

Weller, O. and Alexianu, M. 2007. Recherches ethnoarchéologiques sur le sel dans la zone de Lunca. *Cahiers du sel*, 17: 29-45.

Weller, O., Brigand, R., Alexianu, A. 2007. Cercetări sistematice asupra izvoarelor de apa sărată din Moldova. Bilanțul exploatărilor din anii 2004-2007 efectuate în special în județul Neamț. *Memoria Antiquitatis*, XXIV: 121-190.

Weller, O., Brigand, R. and Alexianu, M. 2010. Recherches systématiques autour des sources salées de Moldavie. Bilan des prospections 2008-2010. *Memoria Antiquitatis*, XXV: 437-504.

Appendix. Names and locations of the informants interviewed within the ethnoarchaeological surveys.

No.	*Name and age of the informant*	*Village/city of the informant (Buzău County)*	*No.*	*Name and age of the informant*	*Village/city of the informant (Prahova County)*
1	Elena Andronic, 58	Punga	1	Maria Anton, 73	Drăgăneasa
2	Floarea Barbu, 80	Buștea	2	Ioana Baciu, 62	Salcia
3	Moise Bâscă, 61	Cănești	3	Mihail Bănică, 84	Cosminele de Jos
4	Șt. Ion Boncu, 63	Muscelul Țigan	4	Gheorghe Cârste, 42	Făget
5	Mihai Bondalici, 28	Lunca Frumoasă	5	Ion Cristea, 59	Dobrota
6	Dumitru Cărăbuș, 64	Colți	6	Maria Despinoiu, 63	Matița
7	Constantin Cârstoiu, 56	Valea Caprei	7	Dorin Nicolae, 36	Trestioara
8	Constantin Cojocaru, 79	Bisoca	8	Elena Geană, 66	Albinari
9	Gheorghe Constantin, 70	Scăeni	9	Voicu Ilioiu, 81	Drajna de Jos
10	Gheorghe R. Cristea, 80	Plavățu	10	Ion Jagă, 75	Valea Morii
11	Aurelia Dobrică, 69	Valea Muscelului	11	Vitoria Jagă, 72	Valea Morii
12	Mircea Dobrotă, 67	Bâsceni	12	Lucreția Jianu, 64	Matița
13	Costică Găman, 72	Bâsceni	13	Elena Leucă, 81	Mireșul Mic
14	Mihail C. Ganea, 47	Bozioru	14	Ion Păun, 82	Poiana Câmpina
15	Lenuța Mărăcine, 61	Beciu	15	Constantin Picu, 68	Salcia
16	Emilia Moise, 57	Buștea	16	Steliana Pișcoci, 77	Sângeru
17	Constantin Moise, 47	Muscelul Cărămănesc	17	Stelian Popa, 39	Băicoi
18	Mircea Neculai, 60	Pietraru	18	Rodica Radu, 60	Cuib
19	Gheorghiță I. Neculai, 76	Pleși	19	Gheorghe Radu, 67	Cuib
20	Aurel Purice, 66	Negoșina	20	Elena Toader, 58	Predeal Sărari
21	Ion C. Stănică, 77	Recea			
22	Geanina Toader, 45	Mânzălești			
23	Sidonia Vasile, 62	Beciu			

Salt Symbolism in the Work of Elena Niculiță-Voronca

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Abstract

The paper analyses the symbolism of salt in the book *Datinele și credințele poporului român adunate și așezate în ordine mitologică* [*Traditions and Beliefs of the Romanian People, Gathered and Chronologically Ordered*], written by Elena Niculiță-Voronca at the turn of the 20th century. Though she did not have any higher education, the author was an active and talented researcher. Through considerable efforts, she gathered within a private project and she created a huge body of work on the intangible heritage of Bukovina, influenced by the co-existence of other nationalities in this region. Furthermore, she focused on respecting the authenticity of the information she received.

Keywords: Salt symbolism, traditions, Elena Niculiță-Voronca, Bukovina.

Even though salt is a resource that human communities have appreciated since prehistory, both through the most common uses, as well at the symbolic level, it has not benefited throughout history from monographs that mirror the attention it enjoys in real life. Thus, on many occasions, the complexity of the universe generated by salt must be reconstituted from smaller pieces scattered in archaeological discoveries, recently made known to the public through specialised studies, in ancient texts with which analogies can be made for the regions that do not benefit from any written sources of this age, in medieval documents, in the works of modern ethnographers, and, last but not least, in the collective or individual memory.

The work of Elena Niculiță-Voronca, entitled *Datinele și credințele poporului român adunate și așezate în ordine mitologică* [*Traditions and beliefs of the Romanian People, Gathered and Chronologically Ordered*], is part of the penultimate category, being the most important of the several volumes she published, even more so since the work published in 1903 is just the first chapter of the entire work, with the other two, referenced in the text by the author, are forever lost (Datcu I., *Elena Niculiță-Voronca și datinile și credințele populare românești din Bucovina* in Voronca 2008, I, 6). For this undertaking, its value increases on account of the fact that it includes an entire chapter dedicated to salt, unusual for the ethnographic works not only of that period, in which references to salt are dispersed in sections dedicated to customs that concern other aspects, with the saline element being treated as a secondary one.

Elena Niculiță-Voronca lived in Bukovina, between the second half of the 19th century and the first half of the 20th century (1862–1939?), in a period during which women had limited access to education, and in an age marked by upheavals in the history of the region. Despite this situation, the author, led by an ardent passion for Romanian mythology and folklore, and by an energetic autodidact spirit, became involved in the cultural life of Bukovina, generating alongside her husband and the local intellectual elites a genuine national awakening of the Romanians of Bukovina. Her mission was made so more difficult by the fact that the sharing of the genuine Romanian customs and traditions was directed towards the Romanian community from Cernăuți/Chernivtsi/Czernowitz and the surrounding area, who were the subjects of a systematic policy of denationalisation.

The support of her family and considerable financial efforts made it possible to commence a personal project that materialised into an oeuvre presenting a vast cultural heritage, specific to Bukovina. Even though she was not formally trained in the field and was severely criticised by the specialists of the era, Elena Niculiță-Voronca focused on respecting the authenticity of the information received from her informers, as a true ethnographer. The quality of the volume *Datinele și credințele poporului român adunate și așezate în ordine mitologică*, certified by the passing of time, established it as an important and substantial regional monograph for its age, particularly since the research was carried out exclusively by the author. The work is structured into four parts, corresponding to the four 'eternal' elements — earth, air, fire, and water — with salt being part of the first. The natural mineral is considered a gift of God, an element with powerful imaginary properties, with numerous and varied functions (purification, compensation, protection), including destructive ones.

The first mention of salt is the well-known folk story *Sarea în bucate* ['Salt in meals'], which Elena Niculiță-Voronca recorded in Botoșani under the name *Ce este mai dulce?* [What is sweeter?]. In short, the story is

about an emperor and his three daughters, whom he asked how much they loved him. The answer of his youngest angered the emperor: 'like salt in meals', which compared to her sister's answers — 'like honey' and, respectively, 'like sugar' — seemed as having a negative meaning, probably because love is often described as 'sweet'. Because of this reply, the father chased away his ungrateful daughter from the palace, who, disguised as a servant in another realm, became the wife of the son of the emperor there. On wedding day, among the guests to the wedding was the bride's father, who was served saltless dishes, while on the table, instead of salt and pepper, there was sugar and honey. Angered and disappointed, the emperor decries this treatment, at which moment the daughter reveals her identity, making him understand the extraordinary love she has for him, summarized in the answer that once drove her away.

Unlike the international versions of the story (Stăncescu 1893: XVII), the Romanian version has a nuance that differentiates it in a positive way. Thus, the emperor's daughter does not answer to the question asked by her father simply as 'like salt', but 'like salt in meals', probably because the primary function discovered during humanity's early days was related to food, where it was most appreciated. Through this replica, the folk author or authors of the story tried to underline the value of salt in the life of the human communities, that of fundamental and indispensible ingredient (Poruciuc 2015: 258).

The story is the only narrative creation related to salt recorded by Elena Niculiță-Voronca. It is followed by the beliefs related to salt, recorded directly by the author, which are presented randomly, without any apparent coherence, indicating after each mentioning the settlement from which the information was collected, sometimes accompanied by the name and ethnicity of the person inquired. If a text did not have a local circulation, it was labelled as *general*.

The traditional Romanian mindset abounds in beliefs and superstitions that exert a major influence over the thinking of this people (Gaster 1883: 216). The origin of the beliefs and superstitions is hard to pinpoint, most likely having a primeval kernel around which nuances evolved throughout time under the influence of human progress. In the rural milieu in general, because the cultural level of the human communities was lower, but also due to a tighter link between man and nature (Ciaușanu 2005: 156), such superstitions and beliefs were widespread. On account of this communion, described both by feelings of admiration and fear, mankind developed ceremonies and offerings (Ciaușanu 2005: 156) through which nature could be recompensed and, on the other hand, received particular qualities, either positive or negative. These symbolic traits originate foremost from the physical properties of the elements from the natural environment. Each experience, each component of their world, led humans to express, either through folk creations, or through some beliefs and superstitions, leading to the personification of evil, but thus highlighting the material means through which it can be cast away (Rosetti 1964: I, 62).

Salt is one of these means, in its capacity as substance that is indispensible to life, being considered a gift of God (Voronca 2008: I, 143), and to which countless and powerful imaginary properties have been assigned, of protection, purification or recompensing, but also an unquestionable destructive force. Accordingly, salt is a dual element, at the same time positive and negative, particularly when used excessively, since, by itself, salt also defines a certain equilibrium. Elena Niculiță-Voronca recorded beliefs that emphasize both facets of the vital mineral, in a haphazard manner, but in the following pages I will attempt to organize a separation the two instances, by dividing the recorded beliefs into two categories, corresponding to the functions played by salt: positive or negative.

Positive functions

Salt is, above all, holy, being considered the 'manna of God', and the 'holy truth' (Voronca 2008: I, 143). Because of its perception as an exponent of divinity, the saline element is found in the folk mindset through antagonism, as the destroyer of the evil represented by the devil (Voronca 2008: I, 146). In this sense, it is believed that some persons that practice witchcraft have devilish servants, who must be fed unsalted food (Voronca 2008: I, 146) so as to not to drive them away or destroy them.

The traditional Romanian customs, superstitions and beliefs reveal another role of salt, that of protector and of the 'plentifulness of the house' (Rmn. *spor al casei*). For this reason, the prohibitions to give away the vital substance are numerous, whether this occurs through theft, borrowing or even gifting. A strong conviction that any action carried out at the start of a cycle — either a year, week, day, agricultural season, or any other kind — perpetuates and influences the events of the entire period to follow, led to heedfulness when it came to borrowing salt on Mondays, to prevent quarrels in the house for the entire week to come (Voronca 2008: I, 143–144; 145).

The effects that the stealing of salt can have are calamitous; the household and its masters will have bad luck or their cattle will even die, since salt protects and ensures the richness and well-being of individuals (Voronca 2008: I, 144). This richness is both concrete,

with salt having at one moment a high economic value, being not only a seasoning, but sometimes an essential food, for humans and animals alike, but also symbolic, on account of its function of 'plentifulness of the house' (Rmn. *spor al casei*).

The reluctance toward borrowing salt has already been mentioned, but in exceptional cases, when it occurs, the precious substance is returned in an even greater quantity (Voronca 2008: I, 144). This is meant to drive away evil (Voronca 2008: I, 144), whereby the quantity returned represents the effective debt, and the supplementary one has the symbolic role of protection. When the Romanian peasant has to borrow salt from an acquaintance, he is always wary about returning it, for fear of having a 'salted life' (Rmn. *viața sărată*) (Voronca 2008: I, 144). The meaning of the term 'salted' is in this case synonymous with hard, difficult, in opposition with that of sweet, easy, beautiful, but the role of salt in this case can be interpreted as being positive, of protecting the house from which it was borrowed. Traditional beliefs hold that it is forbidden for salt and fire to be given on the Ascension Day (Voronca 2008: I, 145), since they protect the household, its livestock and its dwellers. The fire, expressed through embers, signifies in folk beliefs the heavy hearth and quarrel (Voronca 2008, I, 145), and by estrangement these negative states are drawn. From the same apotropaic register, the borrowing of salt is prohibited because cattle could die or become dry (nonlactating) (Voronca 2008: I, 145).

The protective function of the vital mineral is manifested in other situations, too. The most widespread is the protection of the cattle manna by throwing salt on the stove if the milk boils over (Voronca 2008: I, 145). Likewise for protecting the cow's manna, the milk is given salted, and the empty pot is returned unwashed, with a piece of bread and salt, symbolically, alongside the manna (Voronca 2008: I, 146). Bread and salt are placed on the window sill likewise to keep evil away and to have a quiet sleep (Voronca 2008: I, 145), with even the belief that the nocturnal evil forces are satisfied by the treatment received, with salt as the symbol of honesty and friendship, and hence do not harm the household (Voronca 2008: I, 145). Salt protects the entire house, keeping evil away, if it is sprinkled on doorsteps, with the provision that is must be consecrated before being used for this purpose (Voronca 2008: I, 145). It is also believed that if salt is worn inside shoes, spells do not have an effect (Voronca 2008: I, 145). When illness is charmed away, other participants in the event, particularly if they are children, are sprinkled with salt on their tops, so that the illness 'does not catch unto them' (Voronca 2008: I, 146). In the case of a fire, salt has the power to quench the fire until the goods are brought out of the house (Voronca 2008: I, 145). The positive symbolic properties of salt can also be drawn from the belief according to which the toppling over of the pepper box can lead to quarrel, but this can be prevented if salt is sprinkled immediately (Voronca 2008: I, 145).

The belief is also that salt is punitive, particularly in cases of theft; if the thief is discovered, it is sufficient that they are given one of the two sacred elements — bread or salt — 'and nothing will come out' of the thief (Voronca 2008: I, 144). Salt, as well as bread, has the same effect on people who work charms, since it is well known that the enemies of a person avoid eating bread and salt together with him or her, exactly for fear of being punished for the evil they do (Voronca 2008: I, 144). It is also possible that the curse 'May my bread and salt strike you!' (Rmn. *Bată-te pâinea și sarea mea!*) (Voronca 2008: I, 144) refers to the same power of punishment of the vital and indestructible ensemble of the two elements. When 'fire howls', it is believed that 'enemies speak badly of you' and one should throw salt on fire, which leads to their punishment in the form of a painful swelling on the tongue (Voronca 2008: I, 145). This action is explained by the folk belief, among Romanians and other peoples, that fire is foretelling (Ciaușanu 2005: 63), and when sparks jump from the fire, they let one know that they are being talked about by their enemies (Gorovei 1915: 119; Ciaușanu 2005: 64).

In some communities is believed that the vital substance punishes those who dare steal it: whoever steals from a household salt, which protects the people and their dwelling, will have bad luck, since they also steal the evil from the house, which will befall on the thief (Voronca 2008: I, 144).

Salt has also foretelling powers, the belief being that 'whoever steals salt, the salt divulges that they stole' (Voronca 2008: I, 144). Salt also forecasts weather, since it is believed that if the saltbox moistens without a reason, rain will come (Voronca 2008: II, 257). Similarly, for forecasting weather for the entire year to come, on the New Year's Eve twelve onion skins, corresponding to the twelve months of the year, from January to December, are filled with the same quantity of salt, which, if it melts, signifies rainy weather for the respective month, and if it stays dry, the month will be rainless (Voronca 2008: I, 101).

Elena Niculiță-Voronca also recorded several customs and traditions in which salt plays an important role, again stressing its prophetic aspect. Such a practice, known and used even today, though in jest, is to find out the sex of an unborn child. To achieve this, salt is sprinkled on the head of the unwitting pregnant woman, and the first movement is observed: if she touches her nose, the child will be a boy, while if she

touches the mouth or another part of the face, she will birth a girl (Voronca 2008: 146). The interpretation of the movements is probably linked to an analogy between the two parts of the face and the female and male sex organs.

For finding their predestined husband, the marriageable girls also employ salt. They bake a very salted flat bread that they eat before going to sleep, either on the evening of Saint Basil (December 31st–January 1st) or of Saint Andrew (November 29th–30th). The purpose of this flat bread is to cause thirst and, concurrently, a dream in which her predestined spouse brings her water (Voronca 2008: I, 146). The same custom, with the same purpose, of baking a salty flat bread for finding one's predestined husband, is also practiced involving divine help, in the form of genuflexions. The custom consists of baking bread on a Friday evening, so that on Saturday morning a piece is bitten off and put inside her cloth belt, and the rest of the bread is shared with other people. After returning home, the young woman genuflexes and prays that her foreordained spouse will be shown in a dream by one of the elements involved: the belt, bread or salt (Voronca 2008: I, 146).

The abovementioned curse, 'May my bread and salt strike you!', can be interpreted in another key, entirely positive, signifying the honouring of the targeted individual, paralleling another 'reproachment', namely 'May luck strike you!'. This interpretation is plausible, because the Romanian peasant expresses on many occasions both dissatisfaction and hate, as well as love and appreciation, through cursing.

Salt also has a compensatory role in Romanian folk beliefs, as revealed by the act of giving salt to women who spin fabrics, over the set reward, as a gesture of paramount appreciation for the effort they carry out (Voronca 2008: I, 144).

Negative functions

Even though the saline element is perceived in the collective mindset as positive, there are also negative aspects of it, resulting particularly from its excessive use, but also as negative interpretations of actions known as having a positive role. This is why a number of superstitions emerged, with negative references to salt.

All the negative beliefs about salt are based on the prohibition of putting salt on the window sill, either alone or alongside bread. Bread or salt should not be put on the window sill because they draw evil (Voronca 2008: I, 145). It is believed that if salt is placed on the window sill of a house in which a young child is found, their angel has a 'salted road and the luck runs away' (Voronca 2008: I, 145). This belief is preferred to the positive one; thus, salt on the window sill drives away luck and fosters conflict (Voronca 2008: I, 145). In traditional communities, the saying goes that 'the place of salt is on the table' (Voronca 2008: I, 145); it is forbidden that salt be found in any other place of the house, for instance under the chimney, from where sleep is driven away (Voronca 2008: I, 145).

It is difficult to analyse this universal superstition, according to which salt negatively influences people and drives away their luck. The salted road can be translated in this situation by other adjectives, similarly of an unfavourable nature, such as difficult, sluggish, painful.

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Alongside the two categories conceived according to the qualities possessed by salt in folk beliefs, other aspects from the work of Elena Niculiță-Voronca stand out, referring to the physical characteristics of the natural mineral.

One of them concerns the solubility of the salt, likewise underlined by the act of stealing. It is said that whoever steals salt will have the 'luck of salt', which is to say that it is now melted away (Voronca 2008: I, 144). The stimulation of sweating by the excessive consumption of salt probably led to the belief according to which on Easter one should not handle salt because otherwise the hands will sweat for the entire year (Voronca 2008: I, 145). It is difficult to find another explanation for this belief, particularly when considering the link with the Easter holy day.

The work of Elena Niculiță-Voronca highlights a segment of the symbolic universe of salt, underlining the functions this plurivalent resource plays. From the almost two pages dedicated to salt, it can be seen that in the region investigated by the author, salt is associated with the so-called 'plentifulness of the house' (Rmn. *sporul casei*). Similarly, the saline substance protects the household and its occupants, in general, but it also punishes those that try to cause harm, irrespective of their nature. The fact that it has the capacity to forecast weather, but also the sex on an unborn child, particularly in an age when there were no echography machines and fathers wished, most often, male heirs, increases its value. Salt is also considered a reward and, alongside bread, a form of friendship and respect.

They are all doubled by a negative facet of salt, which surprisingly refers to an aspect that also benefits from a positive interpretation: that of placing bread and salt on the window sill. It is believed that in this way evil is drawn, conflict is fostered, and luck and sleep are

driven away. I have failed to identify another concrete explanation for this belief. What should be stressed is that in Romanian folk beliefs, salt symbolism is not exclusively positive.

The present undertaking, by highlighting the folk beliefs on salt from the work of Elena Niculiță-Voronca sought foremost to analyse a segment of the symbolism of this natural vital mineral, used and appreciated in all dimensions of human life, thus revealing its complexity. Another aspect considered was to salvage, at least on the theoretical level, this exquisite cultural heritage represented by the beliefs held by traditional Romanian communities during the turn of the 20th century. Last but not least, I must mention that the beliefs and practices recorded in this work were also found in other regions of Romanian settlement, some surviving to this day, either at the applied level, or only in the collective or individual memory, as revealed by recent studies from the field of Anthropology of Salt, many threatened by disappearance (Alexianu et al. 2007).

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References

Alexianu, M., Weller, O. and Brigand, R. 2007. *Izvoarele de apă sărată din Moldova subcarpatică. Cercetări etnoarheologice*. Iași, Casa Editorială Demiurg.

Ciaușanu, G. F. 2005. *Superstițiile poporului român. În asemănare cu ale altor popoare vechi și noi*. București, Saeculum I.O.

Gaster, M. 1883. *Literatura populară română*. Appendix by Costin, N., *Voroava Garamantilor cu Alexandru Machedon*. București, I.G. Haimann.

Gorovei, A. 1915. Credinți și superstiții ale poporului român. In *Din vieața poporului român, Culegeri și studii, XXVII*. București, Librăriile Socec.

Niculiță-Voronca, E. 2008, *Datinile și credințele poporului român. Adunate și așezate în ordine mitologică* I-II. București, Editura Saeculum Vizual.

Poruciuc, A. 2015. Paradigmatic Presentations of Salt in the Romanian Language and Folklore. In M., Alexianu, R. -G., Curcă., V., Cotiugă (eds.), *Salt Effect. Second Arheoinvest Symposium: From the ethnoarchaeology to the anthropology of salt, 20-21 April 2012, 'Al. I. Cuza' University, Iași, Romania*: 257-260. Oxford, British Archaeological Reports International Series 2760, Archaeopress.

Rosetti, A. (ed.) 1964. *Istoria literaturii romîne*. *Folclorul. Literatura romînă în perioada feudală (1400-1780)*, I. București, Editura Academiei Republicii Populare Romîne.

Stăncescu, D. 1893. *Alte basme culese din gura poporului*, București, H. Steinberg.

Ukrainian Traditional Salt Traders ('Chumaks') in the North of the Sea of Azov (Case Study of Berdyansk Area)

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Abstract

The North of the Sea of Azov long remained a region of activity for Ukrainian traditional salt traders – Chumaks. Expansion of Chumaks in the area where today the city of Berdyansk lies was directly connected with the Zaporizhzhian Cossacks, who collected salt in the local estuaries (salt lakes), although these territories belonged to the Ottoman Empire until 1774. When the lands became part of the Russian Empire, Russian and Ukrainian entrepreneurs began to rent the local estuaries soley for salt extraction. The situation was changed significantly in the XIX century, which was directly related to the emergence and development of the port city of Berdyansk. Opening of the pier and port development created conditions for the transformation of this area into a powerful trade center to which Chumaks' wagons were directed.

There are many reasons to talk about originality and great significance of the phenomenon of Chumaks, which is far beyond the purely economic sphere. To study this phenomenon, we have conducted extensive archival and library heuristics, and conducted a series of oral historical expeditions in the North of the Sea of Azov. Important documents and interesting folk materials, including Chumaks' songs were found. Results of this research are presented in this article.

Keywords: Chumaks, salt, trade, Berdyansk, estuary, the Sea of Azov, the Russian Empire.

For a long time after the fall of Byzantium, over the centuries the Black and Azov seas were peculiar 'inland lakes' of the huge Ottoman Empire. The coastal lands of the northern and eastern Black Sea, as well as the Sea of Azov were the periphery, serving for the empire as a buffer with Moscovia, which under Peter I was transformed into the Russian Empire. This undeveloped buffer zone was a serious obstacle to the realization of possible plans of northern neighbors to change the established order of things, to get access to seas and through them threaten other parts of the Ottoman Empire and to Constantinople itself. In 1762 Catherine II ascended to the Russian throne. Under her policy the Black Sea region began to play a role that cannot be overestimated. Namely, during the reign of this Empress, the political map of the region was radically redrawn: the senescent Ottoman Empire could not successfully resist Russia, which was on the rise and in every way tried to gain access to the sea. Empress Catherine II raised the expansionism conducted by Peter I to a new level.

The territory where Berdyansk was founded had been under rule of the Ottoman Empire until 1774 and under the Crimean Khanate until 1783. In this year it was incorporated into the Russian Empire together with all lands of the Crimean Khanate.

Unlike many other cities of the region, Berdyansk was not the product and the factor of the military territorial expansion of the Russian Empire, but of the economic development of coastal areas, which already for many decades had been under the authority of the officials in St. Petersburg. In fact, these lands had been officially a part of the Russian Empire for 44 years by 1827, when at the bottom of Berdyansk Spit, not far from Berda estuary (which marked the boundary between Taurian and Ekaterinoslav provinces), a wharf had been under construction. In fact, this event is considered the beginning of Berdyansk history.[1]

The North of the Sea of Azov remained for a long time a region of activity for Ukrainian traditional salt traders, or Chumaks. According to a XIX century volume, 'Chumaks, as it is known, are Ukrainians, who travel by oxen to the Crimea for salt and to the Black and Azov seas for fish and transport these products to many Ukrainian trade fairs'.[2]

Expansion of Chumaks in the area where today the city of Berdyansk lies was directly connected with the Zaporizhzhian Cossacks, who collected salt in the local estuaries (salt lakes), although these territories belonged to the Ottoman Empire until 1774. When the lands became part of the Russian Empire, Russian

[1] Much more detailed information about it can be found in the book Gelina Harlaftis, Victoria Konstantinova, Igor Lyman, Anna Sydorenko and Eka Tchkoidze (eds), *Between grain and oil from the Azov to the Caucasus: the port-cities of the eastern coast of the Black Sea, late 18th – early 20th century*, Black Sea History Working Papers, volume 3 (Rethymnon, 2020), p. 299-327.

[2] I. Rudchenko, Чумацкия народныя песни [Chumaks Folk Songs] (Kyiv, 1874), p. 1.

and Ukrainian entrepreneurs began to rent the local estuaries solely for salt extraction. The situation changed significantly in the XIX century, which was directly related to the emergence and development of the port city of Berdyansk. Opening of the pier and port development created conditions for the transformation of this area into a powerful center of trade where Chumaks' wagons were directed.

There are many reasons to talk about the uniqueness and great significance of the Chumaks phenomenon, which is far beyond a purely economic sphere. To study this phenomenon, we have conducted extensive archival and library heuristics and conducted a series of oral historical expeditions in the North of the Sea of Azov. Interesting folk materials, including Chumaks' songs were found. All of this research was presented in sessions of the First International Congress on the Anthropology of Salt.

Researchers studying Chumaks almost unanimously declare the originality and importance of this phenomenon. However, at the beginning of this article we would like to draw attention to a slightly different aspect. This is the people's memory about Chumaks. It is possible to agree with the idea that Chumaks is a phenomenon of everyday life that has been fixed in relatively few written records. So, an important source for studying Chumaks is folk art, including Chumaks' songs.[3]

Understanding of this fact prompted the researchers of the XIX century to record these songs without delay. They had to rush because the new economic realities and development of the railway network made questionable the existence of Chumaks in the future.

The opinion, expressed by Ivan Rudchenko in 1874, was demonstrative in this context: 'Extinction expects, perhaps, Chumaks beneath our very eyes. In all likelihood, the products of their spirit will also not be able to outlive their creators long. That is why it is time to begin to systematically collect and study the Chumak's songs to keep these precious monuments of folk art to science'.[4] Incidentally, it is important in the context of the theme of our article that the lands of the North of the Sea of Azov were repeatedly mentioned in the texts of Chumaks' songs included in the publication by Ivan Rudchenko in 1874. More than half a century passed. The Russian Empire disappeared. The period of the New Economic Policy began in the Soviet Union. It was a short 'golden age' of Ukrainian regional studies that marked a revival of interest in local history. And as it turned out, Chumaks' folklore still firmly stuck in people's memory. In particular, in 1928 the book 'The city of Berdyansk and its surroundings' was published. It included ethnographic materials collected by students of the local pedagogical college in the 1920s. The publication included only eight songs, but among them one was about Chumaks.[5]

More than 80 years passed after the song was recorded. Since 2006 oral historical expeditions in the Northern Azov region have been conducted through Berdyansk State Pedagogical University, an educational institution descended from Berdyansk pedagogical college, whose students recorded the song about Chumaks in the 1920s.

This is noteworthy in that, even if we and our students did not ask a single question about Chumaks during an expedition, some local old-timers nevertheless would mention Chumaks in their interviews. Somebody sang Chumaks' songs, others told anecdotes and superstitions about Chumaks. In particular, Darya Skuybeda, answering the question 'Have you heard anything about mermaids?', told:

> *'Earlier Chumaks traveled for salt. It was a Chumaks Way. And they came to the sea, and spent the night, cooked porridge. One of them says: "What is it? Have you heard a voice?" Other answers: "It seems I have heard. But what is it?" Darkness comes. Disheveled woman is running into the sea, mermaids call her to drown. She was late, because she had put her children to bed. Mermaids grabbed her, wanted to drown. And she died. These mermaids shouted. These were their voices'.*[6]

So, the folk memory about Chumaks is quite deep in the North of the Sea of Azov. Thus it makes sense to pay more attention to the history of Chumaks in the region.

According to some researchers, the roots of the Chumaks' trade in the Sea of Azov could be found in the ancient Greek colonies in the Northern Black Sea region. For example, Ivan Rudchenko wrote that first this trade with Greeks in the region had been carried out by Scythians; then Slavic traders who visited the former Greek colonies in the Middle Ages became the link, which later evolved into Chumaks; these Slavic traders as well as Chumaks used the same trade routes and techniques.[7] Further evolution of Chumaks, Ivan

[3] I. Rudchenko, Чумацкия народныя песни [Chumaks Folk Songs] (Kyiv, 1874), p. 20.

[4] I. Rudchenko, Чумацкия народныя песни [Chumaks Folk Songs] (Kyiv, 1874), p. VI.

[5] Igor Lyman and Victoria Konstantinova, Бердянські педагогічні курси та педагогічний технікум *(1920-1935* роки*)* [Berdyansk Pedagogical Courses and Pedagogical College (1920 – 1935 years)] (Kyiv: Osvita Ukrainy, 2008), p. 390-391 (Materials from the history of Berdyansk State Pedagogical University. Volume III).

[6] Interview of Darya Skuybeda, born in 1929, resident of the village Yelyseyivka of Zaporizhzhye region. January 7, 2008. Interviewer: Svitlana Vyun (BDPU).

[7] I. Rudchenko, Чумацкия народныя песни [Chumaks Folk Songs] (Kyiv, 1874), p. VI.

Rudchenko, following Mykola Kostomarov, reasonably associated with the Cossacks.

In the area where today the city of Berdyansk is located, Zaporizhzhya Cossacks fished and extracted salt for a long time. Chumaks' wagons were directed here. In the edition of 1931 'Materials for the study of industrial associations. Vol. II. Chumaks' Jakiv Ryzhenko described documents about a priest named Savitsky, who 'worked part as a Chumak'. Among the documents there was a passport, which was issued for traveling on Chumaks' wagons 'to the river Don, Cherkassk, Kalmius and spits of the sea for buying fish and finding debtors'.[8]

The lands adjacent to the coast of the Sea of Azov were not among the densely populated regions. The area between the rivers Volchija, Kalmius, Berda, and the Sea of Azov was a part of Kalmius Palanka – one of the least populated administrative units under control of the Zaporizhzhya Cossacks. But the territory near Berdyansk Spit was considered to be one of the most attractive of the lands of Kalmius Palanka, whose leaders gave priority to the protection of Zaporizhzhya manufacturers who extracted salt and fished in estuaries of the Azov coast.

In the last years of the existence of the Zaporizhzhya Cossacks, academician Johann Anton Güldenstädt visited this area in 1774 and described in his diary the process of salt extraction. According to him, many small salt lakes were on Berdyansk Spit. Two of them became completely dried up in summer, and the thin salt crust remained at their gray clay bottom. This salt was collected in heaps. Then in small pits, filled to the brim with clean water, bluish clay that adhered to the salt was washed off. In this way it turned out rather pure salt. Güldenstädt wrote that Zaporizhzhya Cossacks used this salt for their fishing industry and for home consumption. Cossacks claimed that they had right of ownership to the salt. In the opinion of Güldenstädt, because these lakes were too small (only a few thousand paces in circumference), and because the salt obtained from them was still quite dirty despite the washing, these lakes did not deserve special attention.[9]

However, despite Güldenstädt's assessment, in the future salt lakes were not without the attention of enterprising people. But, while earlier Cossacks had used these natural resources at their own discretion, later representatives of the government of the Russian Empire took under their control the issue of permissions for salt extraction. A proposal is preserved, which was submitted by a military officer Maxim Sobetsky to Prince Potemkin in 1784. In fact, it was a draft contract that described in detail rights and obligations of Sobetsky in the conduct of salt extraction. The document was called 'Regulation of Berdyansk salt lakes' and provided:

1. The lessee was required to pay the state 500 rubles a year for rent of the lakes regardless of 'the crop' of salt.
2. The lessee had to build salt warehouses at his own expense. After ten years, these warehouses had to be transferred to state ownership free of charge.
3. When sending salt to Ekaterinoslav and other provinces, as well as by sea, it was forbidden to take duties. Maxim Sobetsky received permission to establish the price of salt.
4. The lessee could not prohibit cattle grazing in circumferences of the salt lakes.
5. If at the end of ten years Maxim Sobetsky did not have time to export all the collected salt, the state was obliged to allow him such exportation.[10]

As we can see, the author of the 'Regulation of Berdyansk salt lakes' did not share the opinion of the academician Güldenstädt that the lakes did not deserve attention.

The economic situation in the region was changed dramatically in connection with urbanization processes.

In 1821 the town of Nogaisk was founded near Obitochna Spit at a distance of three dozen kilometers from Berdyansk Spit. It was supposed that Nogaisk would serve as an important center of trade in the South of Ukraine. When it became clear that the territory near Obitochna Spit was inconvenient for building a port, a more suitable place near Berdyansk Spit was chosen. Soon Berdyansk was founded here. Nogaisk fell to the status of '*zashtatnyi*' [unimportant] town.

Opening of the wharf (pier) of Berdyansk took place on July 1st, 1830. In May of 1830, 'The Odessky vestnik' published the following information for industrialists, relating to the prospects of Berdyansk as a place for the sale of the Crimean salt: *'Opening of this wharf offers prospects for great future profits not just for the nearest towns in Ekaterinoslav and Taurian Provinces but, as people acquainted with local conditions assure, it also will improve the well-being of many settlements in Sloboda Ukraine and*

[8] Ja. Ryzhenko. До історії чумацтва на Україні в середині XVIII ст. [For the history of Chumaks in Ukraine in the middle of the XVIII century], in *Materials for the study of industrial associations. Vol. II. Chumaks* (Kyiv, 1931), p. 117.

[9] Дневник путешествия в южную Россию академика С.-Петербургской Академии Наук Гильденштедта в 1773-1774 г. [Diary of a journey to southern Russia of an Academician of the St. Petersburg Academy of Sciences Güldenstädt in 1773-1774 years], in *Notes of the Odessa Society of History and Antiquities* (1879, Vol. XI), p. 225-227.

[10] Распоряжения (ордера) светлейшаго князя Потемкина Таврическаго правителю Таврической области В.В. Каховскому за 1784 и 1785 годы [Orders of Prince Potemkin Taurian to the governor of Tauria region V.V. Kakhovsky for 1784 and 1785 years], in *Notes of the Odessa Society of History and Antiquities* (1889, Vol. XV), p. 613-614.

Little Russia Provinces, from which there are convenient connections to Berdyansk Spit due to abundance of pastures and absence of large river-crossings. Another benefit from the wharf of Berdyansk is that through time it will turn into a focus of trade in the Crimean salt, for which nowadays ox-driven wagons make trips of nearly 300-verst to the inlands of the Crimea, whereas salt from Kerch to Berdyansk Spit can be transported by coasting boats on much better conditions. Having thus saved both time and money, during a summer season a Chumak instead of making two trips to the Crimean inlands will be making 3 trips to the wharf of Berdyansk'.[11]

The port of Berdyansk was established in 1835. It did not take long for the results of this novelty to be reported. Already in 1838 'Novorossiyskiy calendar' called Berdyansk 'a town' providing the following information: '*Berdyansk. A port town in Taurian Province on the coast of the Sea of Azov, 35 verst from the town of Nogaisk, near a crescent-shaped spit stretching from north to south, in a harbor formed by the spit and the mainland. Having emerged just recently as a small settlement, Berdyansk, judging from its rapid progress, is promising to turn in the future into one of the most important cities and extend its welfare to surrounding countries*'.[12]

Salt trade was not ignored. Already on May 1-st 1841, the Committee of Ministers gave permission to the formation of Berdyansk salt stocks and their sales. A document was drawn up on the initiative of Novorossiysk and Bessarabian Governor General Mikhail Vorontsov, who, according to the official historiography, is considered as the founder, 'father' of Berdyansk. Mikhail Vorontsov closely linked salt trade in Berdyansk with the prospects of the coal industry in the region, which later became known as the Donbass. Novorossiysk and the Bessarabian Governor-General planned to transport coal and anthracite directly through Berdyansk. But, he understood that, because of the low value of the goods, it would not be profitable for Chumaks to carry coal and anthracite to the port near Berdyansk Spit. That is why Mikhail Vorontsov proposed the formation of salt stocks in Berdyansk: now Chumaks could carry coal and anthracite to the port and carry salt on the way back. Besides, according to the plans of Novorossiysk and the Bessarabian Governor General, the possibility of transporting salt from Berdyansk was for the benefit of the grain trade. The cost of goods (mainly grain) exported from Berdyansk equaled 1,173,611 rubles in silver in 1839, 1,223,506 in 1840,[13] 876,471 in 1841,[14] while no goods were imported. Therefore, Chumaks who carried grain to Berdyansk left the town with empty wagons. Some of them had to go from Berdyansk for salt to the Crimea. This increased the cost of grain and salt. Mikhail Vorontsov was sure that if Chumaks were able to buy salt in Berdyansk, it would have saved them time and reduced the cost of transportation. As a result, trade in Berdyansk would receive a powerful impetus to its development.[15]

Already by 1842 Berdyansk had become the administrative center of the eponymous *uezd* [district]. On May 18th, 1843, to encourage the travel by Chumak's salt to Berdyansk, the Emperor endorsed the proposal of the Committee of Ministers about reducing the price of salt from Berdyansk state stocks.[16] It was significant and symptomatic that already in September of 1845 the Office of the Taurian Governor started a case 'About abuses in the sale of salt from Berdyansk state stocks'.[17]

Berdyansk salt lakes were also not forgotten. 'Novorossiyskiy calendar' reported in the mid-1840s that there were three salt lakes on Berdyansk Spit: Long ('*Dolgoe*'), Round ('*Krugloe*') and White ('*Beloje*'), which in good times gave the 'harvest' of salt up to 80 thousand pounds.[18]

It is important that the obligation to care for the storage and sale of salt from 'Berdyansk lake' was specially fixed by 'Instruction for the Chief of the Town and the Port', issued on March 24th, 1852. According to §§ 12 and 14 of the Instruction, the Chief of the Town and the Port[19]

[11] Одесский Вестник *[The Odesskiy vestnik]*, 39 (May 14, 1830), p. 153-154.

[12] Igor Lyman and Andriy Pimenov (compilers), 'Юне місто'. Літопис історії Бердянська очима кореспондентів 'Одеського Вісника' *(1827-1860* **pp.***)* ['Young town'. Chronicle of history of Berdyansk through eyes of reporters of 'The Odesskiy vestnik' (1827-1860)], (Berdyansk – Rostov-on-Don: RA 'Tandem-U', 2007), p. 309-310.

[13] О торговле Азовских портов за 1840-й год [About trade of Azov ports for 1840], Одесский вестник *[The Odesskiy vestnik]*, 90 (November 8, 1841), p. 419.

[14] О торговле Азовский портов за 1841-й год [About the trade of the Azov ports for 1841], *Одесский вестник [The Odesskiy vestnik]*, 84 (October 21, 1842), p. 397.

[15] Полное собрание законов Российской империи [Complete Code of Laws of Russian Empire], St. Petersburg, col. II, vol. XVI, sec. I, № 14502, p. 347-348.

[16] Полное собрание законов Российской империи [Complete Code of Laws of Russian Empire], St. Petersburg, col. II, vol. XVIII, sec. I, № 16870, p. 343.

[17] Государственный архив в Автономной Республике Крым [State Archive of the Autonomous Republic of Crimea] fond 26, opis 1, delo 14710, 'About abuses in the sale of salt from Berdyansk state stocks'.

[18] Новороссийский календарь на 1846 год, издаваемый от Ришельевского лицея [Calendar of Novorussia for the year of 1846, published by the Richelieu Lyceum], (Odessa: City Typography, 1845), p. 63.

[19] In general, this official was in charge of administering the town and the port, providing for progress in trade and prosperity of the town and its population, under direct supervision from the Office of Novorossiysk and the Bessarabian Governor General. The Chief of the Port accumulated in his hands administrative and executive power in the town, control over municipal economy and the right to approve auctions run by the City Hall for giving land plots for the construction of buildings and planting of gardens. Since the appearance of this post until 1855, the position of the Chief of the Town and the Port of Berdyask was occupied by Colonel Grigoriy Nikitich Chernyaev, Colonel Delvaux and Lieutenant Colonel V.A.Vladislavlev. Later it was taken by Lieutenant Captain A.A.Ivkov (1856-1862), Count Pavel Petrovich Maksutov (1863-1876), First Rank Captain Petr Petrovich

was obliged to check monthly the conditions of the sale and storage of salt in Berdyansk, to take care that buyers' requirements were met quickly and correctly and to ensure a decrease of prices for transportation of salt from the Crimea Salt Board through contractors. Additionally, this official had to watch out for Nogais, who until recently had been nomads and by Imperial order on May 13th, 1805, had received the right to extract salt from 'Berdyansk lake'. The Chief of the Town and the Port had to ensure that Nogais, according to conditions of the above mentioned Imperial order, did not use the extracted salt for sale, exchange or donation to other people.[20]

The peculiar chronological description of the history of Chumaks in Berdyansk area are the articles of the most popular in the XIX century regional newspaper 'The Odesskiy vestnik' (The Odessa Herald'). Several years ago we published three volumes of the archeographic edition, which contains about 600 newspaper articles about Berdyansk from 1827-1893.[21] Chumaks in Berdyansk were described in 24 articles of 'The Odesskiy vestnik'. Here we will address only a few of them.

On May 5th, 1844, a reporter informed that carters were arriving to the town with products of not only neighboring provinces but also from Poland. Now Chumaks could find here not only fish, but also salt. Selling of salt could not be more successful. Many streets were full of wagons taking salt. Even many neighboring landowners took salt in large quantities. From January 1st, 1844, fifty percent more salt was sold than in the previous three years.[22]

On September 9th, 1844, 'The Odesskiy vestnik' wrote that even the previous year's salt reserves were not exhausted in Berdyansk, and the government already provided for the delivery to the port of 200 thousand poods[23] of salt from Evpatoriya. Delivery of products from Kharkov 'and other remote provinces' was stimulated by governmental permission to ship the Crimean salt to Berdyansk for further transportation to the interior provinces of the Empire. Chumaks from 'remote provinces' were very satisfied.[24]

Just a couple of weeks later, the newspaper reported that the first supply of salt (200 thousand poods) had already been sold. Chumaks were very pleased because of the good quality of the new batch of salt, and up to eight thousand poods were sold in Berdyansk in just three days.[25]

In August of the next year, the newspaper wrote that up to 100 thousand poods of salt had been delivered to Berdyansk, and soon (no later than in September) the same amount was expected, which was necessary to meet the needs of Chumaks, who transported grain to the port.[26]

Summarizing the results of trade in 1845, a reporter of 'The Odesskiy vestnik' Vasiliy Kryzhanovskiy noted that more than 200 thousand poods of salt were sold during the year. It would have been doubled but, because there was no stock of the past year, in early spring many Chumaks had to go back without salt. Kryzhanovskiy hoped that thanks to measures undertaken by the Governmant, Chumaks would no longer feel a lack of salt in Berdyansk. Thanks to the salt operations, which Vasiliy Kryzhanovskiy called 'a new branch of industry', the town received a great benefit: now the delivery of goods to Berdyansk were fifty percent cheaper.[27]

When heated debate about the advantages of Berdyansk over the other Azov ports broke out in the press in 1847, an author of the feuilleton 'About the trade value of Berdyansk' formulated five important features of Berdyansk, which, according to him, any other considered port did not have. One of these features concerned exactly salt: closeness to Henichesk salt lakes, which allowed forming in Berdyansk stocks of salt for selling to Chumaks, who brought goods for export to the town.[28]

Schmidt (1876-1886) and State Councilor in deed Leonid Alekseevich Zavalishin (since 1887).

[20] Полное собрание законов Российской империи [Complete Code of Laws of Russian Empire], St. Petersburg, col. II, vol. XXVII, sec. I, № 26095, p. 181-183.

[21] Igor Lyman and Andriy Pimenov (compilers), *'Юне місто'.* Літопис історії Бердянська очима кореспондентів *'Одеського Вісника' (1827-1860* pp.*)* ['Young town'. Chronicle of history of Berdyansk through eyes of reporters of 'The Odesskiy vestnik' (1827-1860)], (Berdyansk – Rostov-on-Don: RA 'Tandem-U', 2007), *358 p.*; Igor Lyman and Viktoria Konstantinova (compilers), *'Кращий порт Азовського моря'.* Літопис історії Бердянська очима кореспондентів *'Одеського Вісника' (1861-1875* pp.*)* ['The best seaport of the Sea of Azov'. Chronicle of history of Berdyansk through eyes of reporters of 'The Odesskiy vestnik', (1861-1875)], (Berdyansk – Taganrog: RA 'Tandem-U', 2007), 402 p.; Igor Lyman and Viktoria Konstantinova (compilers), *'Повітова столиця'.* Літопис історії Бердянська очима кореспондентів *'Одеського Вісника' (1876-1893* pp.*)* ['The capital of uezd'. Chronicle of history of Berdyansk through eyes of reporters of 'The Odesskiy vestnik' (1876-1893)], (Berdyansk – Nevinnomysk: RA 'Tandem-U', 2007), 380 p.

[22] V[asiliy] Kr[izhanovskiy], 5-го Мая [5th May], Одесский вестник *[The Odesskiy vestnik]*, 41 (May 20, 1844), p. 201-202.

[23] 1 pood = 16.38 kilograms.

[24] V[asiliy] K[rizhanovskiy], 4-го Сентября [4th September], Одесский вестник *[The Odesskiy vestnik]*, 75 (September 9, 1844), p. 364.

[25] V[asiliy] K[rizhanovskiy], 18-го Сентября [18th September], Одесский вестник *[The Odesskiy vestnik]*, 79 (September 30, 1844), p. 397.

[26] 20-го Августа [20th August], Одесский вестник *[The Odesskiy vestnik]*, 69 (August 29, 1845), p. 343.

[27] V[asiliy] K[rizhanovskiy], 26-го Ноября [26th November], Одесский вестник *[The Odesskiy vestnik]*, 97 (December 5, 1845), p. 485.

[28] M. Buhteev, О торговом значении Бердянска [About the trade value of Berdyansk], Одесский вестник *[The Odesskiy vestnik]*, 38 (May 10, 1847), p. 199-200.

In August of 1848 a reporter of 'The Odesskiy vestnik' Trandafilov remarked that, because the Government had reduced the salt prices by eight kopecks per pood, sale of salt in Berdyansk increased significantly in comparison with the previous year. Hundreds of Chumaks from the hinterland began to arrive in Berdyansk in empty wagons specifically for salt.[29]

On June 22nd, 1852, Vasiliy Kryzhanovskiy informed readers that, due to the request of Novorossiysk and the Bessarabian Governor General Mikhail Vorontsov, as of August 16th, 1850, the Government allowed charging the excise duty for salt brought from the Crimea not in Kerch but directly in Berdyansk. It was stipulated that this experiment would last 5 years. In May and June of 1852 entrepreneurs brought by coasters from Kerch to Berdyansk up to 60 thousand poods of salt, and from this amount more than 40 thousand poods were bought up by Chumaks until June 21st. More than 52 thousand wagons arrived in Berdyansk for salt. An entrepreneur, who invested in the business 1000 rubles, gained 4000 in only two months.[30]

On the eve of the Crimean (Eastern) War, in July of 1853 'The Odesskiy vestnik' wrote: Chumaks, who brought grain to Berdyansk, as usual, bought salt which was delivered here from Kerch by private entrepreneurs. These entrepreneurs brought every year more and more salt, so that in the last year throughout the entire navigation a little more than 165 thousand poods were delievered, whereas only during three months of this year were brought more than 260 thousand poods.[31]

The Crimean (Eastern) War interrupted economic development of Berdyansk. So Vasiliy Kryzhanovskiy expressed the hope in 'The Odesskiy vestnik' in 1858 that the trade of salt in Berdyansk again could be able to achieve those volumes which had been before the war. During the navigation of 1859 Berdyansk expected delivery of up to one million poods of salt: 300 thousand poods for state stocks and 700 thousand poods for private ones. The hope was expressed that this could be of great help for Chumaks, who suffered heavy losses in previous years.[32]

But in 1866, a respondent of the newspaper expressed regret that the business of Chumaks was not much developed in these areas, and therefore the charges for transportation were very high.[33]

In several articles of the newspaper[34] Chumaks were mentioned in the context of the discussion about building of the railway to Berdyansk.[35]

Vasiliy Kryzhanovskiy, who was one of the most active Berdyansk reporters of 'The Odesskiy vestnik', several times mentioned conversations with Chumaks in his diaries for 1865, 1866, 1870, 1875 and 1876.[36] For him, Chumaks were like a source of information about weather and crops on lands of Bedyansk and other areas.

It is very telling that in a number of the above-mentioned documents, relating to the first decades of the existence of Berdyansk, the term 'Chumak' was used interchangeably with the term 'carter' ('*furschyk*'). In this context it is worth mentioning that Ivan Rudchenko wrote the name of Chumaks '*has been recently appropriated to the Little Russian* [Ukrainian] *carters, engaged in the delivery of not their goods. Thus, Chumaks, according to our present notions, are nothing more than the small traders and industrialists who transport fish and salt, or just carters*'.[37]

Visiting Berdyansk by Chumaks has been mentioned in several papers about Chumaks. For example, in the work 'Chumaks on Zvenyhorodschyna' in the section 'Where Chumaks went' we can read: 'For fish they went to Rostov, Mariupol, Kerch, Berdyansk, where they took dry fish'.[38] Several pages of the article by N. Bukatevych 'Chumaks in the first half of the XIX century. According

[29] A. Trandafilov, 11-го Мая [11th May], Одесский вестник *[The Odesskiy vestnik]*, 40 (May 19, 1848), p. 210.

[30] Vasiliy Kryzhanovskiy, 22-го Июня. О торговле *солью в Бердянске* [22nd June. About the salt trade in Berdyansk], Одесский вестник *[The Odesskiy vestnik]*, 52 (July 2, 1852), p. 2.

[31] 8-го *Июня* [8th June], Одесский вестник *[The Odesskiy vestnik]*, 67 (June 16, 1853), p. 1.

[32] V. Kryzhanovskiy, 1-го декабря [1st December], Одесский вестник *[The Odesskiy vestnik]*, 138 (December 9, 1858), p. 727.

[33] 3-го сентября [3rd September], Одесский вестник *[The Odesskiy vestnik]*, 198 (September 10, 1866), p. 652.

[34] Vlad. S. 24-го Февраля [24th February], Одесский вестник *[The Odesskiy vestnik]*, 28 (March 11, 1858), p. 123-124; D. G. Ответ Бердянскому корреспонденту [Response to Berdyansk correspondent], Одесский вестник *[The Odesskiy vestnik]*, 30 (March 15, 1858), p. 134-135; О железной дороге к Бердянску. (Журнал Бердянской земской управы от 28 января 1869 г.) [About rail to Berdyansk (Journal of Berdyansk Zemstvo Council dated 28 January 1869)], Одесский вестник *[The Odesskiy vestnik]*, 53 (March 9, 1869), p. 177.

[35] This discussion lasted for 50 years: the proposal to bring the railway to Berdyansk was suggested in the press already in 1847 (Igor Lyman, 'Полеміка щодо з'єднання залізницею Бердянська з Дніпровським Надпоріжжям та іншими місцевостями Катеринославщини в публікаціях 'Одеського Вісника' 1847 року [Polemics regarding the connection of Berdyansk with Dnieper region and other localities of Ekaterinoslav province by rail in publications of 'The Odesskiy vestnik' in 1847]', *Pridneprovya: historical and local history researches: scientific research journal,* 8 (2010), p. 111-121). But only in 1898 the construction of the railway Chaplin-Pology-Berdyansk 206 km length was basically finished.

[36] Konstantin Bakhanov and Igor Lyman, Бердянск *в* дневниках титулярного советника *В.К.* Крыжановского. Крыжановский В.К. Дневники [Berdyansk in Diaries of the Titular Councilor V.K. Kryzhanovskiy. Kryzhanovskiy V.K. Diaries] (Zaporizhzhya: Prosvita, 2002), 218 p.

[37] I. Rudchenko, Чумацкия народныя песни [Chumaks Folk Songs] (Kyiv, 1874), p. 1.

[38] Чумаки на Звиногородщині [Chumaks on Zvenyhorodschyna], in *Materials for the study of industrial associations. Vol. II. Chumaks* (Kyiv, 1931), p. 18.

to archival matherials of Odessa regional archives' were devoted exactly to Chumaks in Berdyansk.[39]

Considering connections of Chumaks with Berdyansk, we should not forget that the last was a migrant town in the XIX century, and a large percentage of its residents was born outside of this settlement. Many people migrated here from Ukrainian regions, traditionally engaged in Chumaks' business. For example, Theodosij Ya. Voronoy[40] (1837 – March 1910), a famous educator, social activist, and director of Berdyansk Boy's Gymnasium belonged to the family of a Chumak. His father Yakov was born in Lubny, bought a plot of land in the village of Zhuravka, settled there and became a Chumak, transporting salt from the Crimea.

Interestingly, Chumaks remained one of the earliest childhood recollections for the most successful Berdyansk students of Theodosij Ya. Voronoy – Vladimir (Waldemar) Haffkine, who later became an outstanding scientist, bacteriologist and epidemiologist at the service of the British Crown.[41]

The salt trade in Berdyansk was described in some reports of British Consuls.[42] In particular, Robert William Cumberbatch[43] wrote from Berdyansk to London on December 31st, 1863: '*The salt lakes were very productive, realizing over 400,000 poods of salt, or about 133,000 cwt., giving a clear excise duty to the Government of 120,000 rbls., or 18,461l.*'[44]

Acting Consul in Berdyansk William George Wagstaff[45] placed in his report on July 14th, 1864, such information: '*Salt Lakes. The three salt lakes, "Long", "Round", and "Large", found on the sand spit, yield annually about 5,000 tons of salt. Unfortunately, the enterprising spirit of dealers in this article has begun to wane; in consequence of the many formalities to be observed, coupled with the present high excise duty, no profit is left to speculators. The falling off has brought into existence another evil. The peasant in the interior formerly transported wheat to the town at a low rate, knowing he was always able to obtain a return load of salt; now this resource is wanting, it is to be feared that the costs of transport of grain will be increased. The fish it is hoped will supply this want, as a great many cargoes have lately been brought from the opposite side of the Azoff instead of to Mariopol, which is the principal mart for fish in the sea of Azoff*'.[46]

On January 16th, 1865, Wagstaff reported: '*Domestic Trade. Of the many articles of commerce of this place, fish and salt are the most important. The fishing season last year was very successful, particularly during the autumn. By the statistical account rendered to the Imperial Government, only 394 tons of salt were extracted from the lakes in the immediate vicinity of this town; but a much larger quantity must have been collected. The quantity of salt arrived at Berdiansk by sea was 7,501 tons*'.[47]

The British Consul in Berdyansk James Ernest Napoleon Zohrab informed London on January 6th, 1866: '*Salt, which forms an important item in the local trade, has not been collected during the past season, as the Government has sequestered the revenues of this branch of industry to pay the debts of the contractor. In the summer a Commission was appointed to report on the resources of the lakes, and while the investigation was in progress the deposits of salt were not collected. Thus both creditor and debtor have been losers*'.[48]

'Report by Vice-Consul Wagstaff on the Trade and Commerce of Berdiansk for the Year 1875', dated February 28th, 1876, informed: '*A remarkable falling off in the trade of salt and fish is observed. It is computed at 60 per cent. The want of roads has driven this important branch into new channels: Taganrog and Ghenichesk now receive these articles, which are conveyed into the interior by railroad*'.[49]

On January 19th, 1880, British Vice-Consul in Berdyansk Harvey Robert Lowe noted: '*It is impossible to overrate the immense advantages to the trade of this port a railway would give. The exports would probably be doubled, and a large trade in coal and salt to and from the interior would at once spring up*'.[50]

[39] N. Bukatevych, Чумацтво в І-й половині XIX сторіччя. За архівними матеріялами Одеського краєвого архіву [Chumaks in the first half of the XIX century. According to archival matherials of Odessa regional archives], in *Materials for the study of industrial associations. Vol. II. Chumaks* (Kyiv, 1931), p. 89-92.

[40] Victoria Konstantinova and Igor Lyman, Бердянська чоловіча гімназія (остання третина XIX століття) [Berdyansk Boy's Gymnasium (the last third of the XIX century)] (Kyiv: Osvita Ukrainy, 2006), p. 14, 16, 19, 74, 82, 83, 226, 227, 250, 307, 316, 328, 330, 331, 336, 337, 347, 349, 350, 352, 381, 384, 386-389, 391, 393, 394, 398, 399, 420, 422, 437, 470, 471, 481.

[41] National Library of Israel, W.M.W. Haffkine Archive, ARC Ms. Var. 325/40, 'Biographical notes...', l. 33.

[42] Konstantinova Victoria, Lyman Igor, Ignatova Anastasiya, *European Vector of the Northern Azov in the Imperial Period: British Consular Reports about Italian Shipping* (Berdyansk, 2016), 184 p.

[43] By the way, he is a great-great-grandfather of Benedict Timothy Carlton Cumberbatch – famous contemporary British actor (Igor Lyman and Viktoria Konstantinova. 'British Consul in Berdyansk Cumberbatch, Great-Greatgrandfather of Modern Sherlock Holmes', in *Scriptorium nostrum*, 2017, № 2 (8), p. 195-207).

[44] Commercial Reports Received at the Foreign Office from Her Majesty's Consuls between July 1st, 1863, and June 30th, 1864 (London: Harrison and Sons, 1864), p. 262-265.

[45] Igor Lyman and Victoria Konstantinova, Британський консул у Бердянську Вільям Георг Вагстаф [British Consul in Berdyansk William George Wagstaff], in *Scriptorium nostrum*, 2015, № 3, p. 72-90

[46] Commercial Reports Received at the Foreign Office from Her Majesty's Consuls between July 1st, and December 31th, 1864 (London: Harrison and Sons, 1865), p. 118-127.

[47] Commercial Reports Received at the Foreign Office from Her Majesty's Consuls (London: Harrison and Sons, 1865), p. 13-18.

[48] Commercial Reports Received at the Foreign Office from Her Majesty's Consuls (London: Harrison and Sons, 1866), p. 51-57.

[49] Commercial Reports Received at the Foreign Office from Her Majesty's Consuls (London: Harrison and Sons, 1876), p. 1557-1562.

[50] Commercial Reports Received at the Foreign Office from Her Majesty's Consuls (London: Harrison and Sons, 1880), p. 845-850.

In general, Chumaks prospered until the end of the XIX century, when competition from railroads made traditional trade routes unprofitable. Chumaks had contributed to the economic development of Berdyansk and Ukraine in general, and then 'gave way' to steam engines. These occurred in the general context of the modernization processes in the Russian Empire of the end of the XIX to the early XX century.

Regarding the collection of salt in the local estuaries (salt lakes) in Berdyansk, it continued until the beginning of the 1960s. Now, estuaries still exist in Berdyansk, but where there is not a layer of salt on them. According to one tale, salt disappeared due to the level of groundwater and drainage system changes.

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References

20-го Августа [20th August], Одесский вестник *[The Odesskiy vestnik]*, 69 (August 29, 1845).

3-го сентября [3rd September], Одесский вестник *[The Odesskiy vestnik]*, 198 (September 10, 1866).

8-го *Июня* [8th June], Одесский вестник *[The Odesskiy vestnik]*, 67 (June 16, 1853).

A. Trandafilov, 11-го Мая [11th May], Одесский вестник *[The Odesskiy vestnik]*, 40 (May 19, 1848).

Bakhanov, K. and Lyman I. 2002. Бердянск *в* дневниках титулярного советника *В.К.* Крыжановского. Крыжановский В.К. Дневники [Berdyansk in Diaries of the Titular Councilor V.K. Kryzhanovskiy. Kryzhanovskiy V.K. Diaries]. Zaporizhzhya, Prosvita.

Buhteev, M. O. 1847. торговом значении Бердянска [About the trade value of Berdyansk], Одесский вестник *[The Odesskiy vestnik]* 38.

Bukatevych, N. 1931. Чумацтво в І-й половині XIX сторіччя. За архівними матеріялами Одеського краєвого архіву [Chumaks in the first half of the XIX century. According to archival matherials of Odessa regional archives]. In *Materials for the study of industrial associations II. Chumaks*. Kyiv.

Commercial Reports Received at the Foreign Office from Her Majesty's Consuls between July 1st, 1863, and June 30th, 1864 (London: Harrison and Sons, 1864).

Commercial Reports Received at the Foreign Office from Her Majesty's Consuls between July 1st, and December 31th, 1864 (London: Harrison and Sons, 1865).

Commercial Reports Received at the Foreign Office from Her Majesty's Consuls (London: Harrison and Sons, 1865).

Commercial Reports Received at the Foreign Office from Her Majesty's Consuls (London: Harrison and Sons, 1866).

Commercial Reports Received at the Foreign Office from Her Majesty's Consuls (London: Harrison and Sons, 1876).

Commercial Reports Received at the Foreign Office from Her Majesty's Consuls (London: Harrison and Sons, 1880).

D. G. Ответ Бердянскому корреспонденту [Response to Berdyansk correspondent], Одесский вестник *[The Odesskiy vestnik]*, 30 (March 15, 1858).

Gelina, H., Konstantinova, V., Lyman, I., Sydorenko, A. and Eka Tchkoidze (eds.) 2020. *Between grain and oil from the Azov to the Caucasus: the port-cities of the eastern coast of the Black Sea, late 18th – early 20th century*, Black Sea History Working Papers Rethymnon.

Ja. Ryzhenko. 1931. До історії чумацтва на Україні в середині XVIII ст. [For the history of Chumaks in Ukraine in the middle of the XVIII century]. In *Materials for the study of industrial associations II. Chumaks*. Kyiv.

Konstantinov, V., Lyman, I. and Ignatova, A. 2016. *European Vector of the Northern Azov in the Imperial Period: British Consular Reports about Italian Shipping*. Berdyansk.

Krizhanovskiy, V. 1844. 4-го Сентября [4th September], Одесский вестник *[The Odesskiy vestnik]* 75.

Krizhanovskiy, V. 1844. 5-го Мая [5th May], Одесский вестник *[The Odesskiy vestnik]* 41.

Krizhanovskiy, V. 1845. 26-го Ноября [26th November], Одесский вестник *[The Odesskiy vestnik]* 97.

Krizhanovskiy, V. 1852. 22-го Июня. О торговле *солью в Бердянске* [22nd June. About the salt trade in Berdyansk], Одесский вестник *[The Odesskiy vestnik]* 52.

Kryzhanovskiy. V. 1858. 1-го декабря [1st December], Одесский вестник *[The Odesskiy vestnik]* 138.

Lyman I. 2010. 'Полеміка щодо з'єднання залізницею Бердянська з Дніпровським Надпоріжжям та іншими місцевостями Катеринославщини в публікаціях 'Одеського Вісника' 1847 року [Polemics regarding the connection of Berdyansk with Dnieper region and other localities of Ekaterinoslav province by rail in publications of 'The Odesskiy vestnik' in 1847]', *Pridneprovya: historical and local history researches: scientific research journal,* 8.

Lyman, I. and Konstantinova, V. 2006. Бердянська чоловіча гімназія *(*остання третина XIX століття*)* [Berdyansk Boy's Gymnasium (the last third of the XIX century)]. Kyiv, Osvita.

Lyman, I. and Konstantinova, V. 2017. 'British Consul in Berdyansk Cumberbatch, Great-Greatgrandfather of Modern Sherlock Holmes'. In *Scriptorium nostrum*, 8.

Lyman, I. and Konstantinova, V., (eds.) 2007. *'Кращий порт Азовського моря'. Літопис історії Бердянська*

очима кореспондентів 'Одеського Вісника' (1861-1875 рр.) ['The best seaport of the Sea of Azov'. Chronicle of history of Berdyansk through eyes of reporters of 'The Odesskiy vestnik', (1861-1875)]. Berdyansk – Taganrog: RA 'Tandem-U.

Lyman, I. and Konstantinova, V., (eds.) 2007. *'Повітова столиця'. Літопис історії Бердянська очима кореспондентів 'Одеського Вісника' (1876-1893 рр.)* ['The capital of uezd'. Chronicle of history of Berdyansk through eyes of reporters of 'The Odesskiy vestnik' (1876-1893)]. Berdyansk – Nevinnomysk: RA 'Tandem-U'.

Lyman, I. and Konstantinova, V., 2008. Бердянські педагогічні курси та педагогічний технікум *(1920-1935* роки*)* [Berdyansk Pedagogical Courses and Pedagogical College (1920 – 1935 years)]. Kyiv, Osvita.

Lyman, I. and Konstantinova, V., 2015., Британський консул у Бердянську Вільям Георг Вагстаф [British Consul in Berdyansk William George Wagstaff], in *Scriptorium nostrum*, 2015, № 3

Lyman, I. and Pimenov, A. (eds.) 2007. *'Юне місто'. Літопис історії Бердянська очима кореспондентів 'Одеського Вісника' (1827-1860 рр.)* ['Young town'. Chronicle of history of Berdyansk through eyes of reporters of 'The Odesskiy vestnik' (1827-1860)], (Berdyansk – Rostov-on-Don: RA 'Tandem-U').

National Library of Israel, W. M. W. Haffkine Archive, ARC Ms. Var. 325/40, 'Biographical notes...', l. 33.

Rudchenko, I. 1874. Чумацкия народныя песни [Chumaks Folk Songs], Kyiv.

V[asiliy] K[rizhanovskiy], 18-го Сентября [18th September], Одесский вестник *[The Odesskiy vestnik]*, 79 (September 30, 1844).

Vlad S. 1858. 24-го Февраля [24th February], Одесский вестник *[The Odesskiy vestnik]*.

Государственный архив в Автономной Республике Крым [State Archive of the Autonomous Republic of Crimea] fond 26, opis 1, delo 14710, 'About abuses in the sale of salt from Berdyansk state stocks'.

Дневник путешествия в южную Россию академика С.-Петербургской Академии Наук Гильденштедта в 1773-1774 г. [Diary of a journey to southern Russia of an Academician of the St. Petersburg Academy of Sciences Güldenstädt in 1773-1774 years]. In *Notes of the Odessa Society of History and Antiquities* XI.

Новороссийский календарь на 1846 год, издаваемый от Ришельевского лицея [Calendar of Novorussia for the year of 1846, published by the Richelieu Lyceum]. Odessa: City Typography, 1845.

О железной дороге к Бердянску. (Журнал Бердянской земской управы от 28 января 1869 г.) [About rail to Berdyansk (Journal of Berdyansk Zemstvo Council dated 28 January 1869)], *Одесский вестник [The Odesskiy vestnik]*, 53 (March 9, 1869).

О торговле Азовский портов за 1841-й год [About the trade of the Azov ports for 1841], Одесский вестник *[The Odesskiy vestnik]*, 84 (October 21, 1842).

О торговле Азовских портов за 1840-й год [About trade of Azov ports for 1840], Одесский вестник *[The Odesskiy vestnik]*, 90 (November 8, 1841).

Полное собрание законов Российской империи [Complete Code of Laws of Russian Empire], St. Petersburg, col. II, vol. XVI, sec. I, № 14502.

Полное собрание законов Российской империи [Complete Code of Laws of Russian Empire], St. Petersburg, col. II, vol. XVIII, sec. I, № 16870.

Полное собрание законов Российской империи [Complete Code of Laws of Russian Empire], St. Petersburg, col. II, vol. XXVII, sec. I, № 26095.

Распоряжения (ордера) светлейшаго князя Потемкина Таврическаго правителю Таврической области В.В. Каховскому за 1784 и 1785 годы [Orders of Prince Potemkin Taurian to the governor of Tauria region V.V. Kakhovsky for 1784 and 1785 years], in *Notes of the Odessa Society of History and Antiquities* (1889, Vol. XV).

Чумакина Звиногородщині [Chumaks on Zvenyhorodschyna], in *Materials for the study of industrial associations. Vol. II. Chumaks* (Kyiv, 1931).

Linguistics

Germanic Lexical Evidence that Clarifies the Multiple Meanings of the Old European Root **sal-*

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Abstract

In mainstream etymological dictionaries, numerous designations of salt and salty matters have been referred to a Proto-Indo-European root **sal-*, which more recent linguists have presented, with a laryngeal addition, under the form of **seH$_a$-(e)l-*. Many etymological comments that are to be found in entries on salt terminology actually indicate that **sal-* is a *European* rather than an Indo-European root, since recorded terms based on it occur in European historical languages (plus Tocharian and Armenian, both of which have obvious ties with Europe), but they do not also occur in languages belonging to the vast Indo-Iranian branch. The two authors of this paper insist on Germanic salt terminology, first of all, because it is especially in Germanic where an already propounded connection between words of the *salt-* family and designations of a certain colour (defined as 'dirty gray' or 'brownish yellow') is rather obvious.

Keywords: salt, IE roots, sallow, rock salt, brine.

The authors of the present article aim to point out the importance of Germanic as outstanding among European languages, which preserved significant terminology based on the prehistoric (possibly Old European) root **sal-* 'salt', and which more recently has been presented as **seH$_a$-(e)l-* (see below). We will review earlier propositions regarding a connection between the vast lexical family of **sal-* 'salt' and the designation of a peculiar colour, which we consider to have originally referred to rock salt. We will also take into consideration a species of willow whose European names (such as Latin *salix* and English *sallow*) appear to have a connection with the same root **sal-*. In the final part of the article, some archaeological arguments will be brought in to sustain our etymological views.

In entry 5.81 (SALT) of his Indo-European dictionary (ed. 1988), Buck makes the following observation: 'Nearly all the European words for 'salt' [including Greek *hals* (ἅλς), Latin sāl, Irish *salann*, Welsh *halen*, Gothic *salt*, Latvian sāls, Church Slavonic *solĭ*, etc.],
also Armenian ał and Tocharian *sāle* go back to an IE **sal-* 'salt'.' In the same entry, Buck goes on to note that Indic terms for salt, such as Sanskrit *lavana-* and *usaka-* are derivatives from Indic roots (*lu-* 'cut' and *us-* 'burn', respectively).[1] As observed in an earlier article (Poruciuc 2011: 215), Latin *sāl* is commonly considered to derive from a Proto-Indo-European (PIE) root **sal-* 'salt', which, in its turn, may be the same as or directly related to **sal-* 'dirty, gray' (see AHDEL entry on **sal-*[2] discussed below). The last aspect would imply that PIE **sal-* may originally have referred to the colour of rock-salt blocks, extracted from mines. The respective issue deserves extensive discussion, just like the issue of the apparent lack of Indo-Iranian terms based on the root **sal-*.

The impressive abundance of European terms based on **sal-* 'salt', as well as the absence of Indo-Iranian cognates of such terms, may raise doubts about the applicability of the label 'Indo-European' to the root under discussion. Nevertheless, a recent synthetic book on Indo-European matters (Mallory and Adams: 200; 261)[2] suggests that Sanskrit *salilá-* 'sea, flood' may also be based on the root **seH$_a$-(e)l-* 'salt'. For now, we remain cautious about the position of that Sanskrit term as a putative cognate of the European terms belonging to the well-recorded *sal-* family. As suggested in another article (Poruciuc 2008), Sanskrit *salilá-* may only indirectly refer to salt. We are inclined to consider that one European cognate of *salilá-* would be not exactly Latin *sāl* 'salt', but rather Latin *salum* 'open sea, open roadstead' – see Ernout and Meillet 1985, s.v. *salum* (where a Roman sea-goddess, *Salācia*, is also mentioned).

With or without an Indo-Iranian offshoot, the root **sal-* 'salt' appears to belong to Europe (or even to Old Europe). Significant for the aims of this article is the existence of terms based on old suffixed extensions of the same basic root **sal-*, as manifest in Gothic *salt*, Irish Gaelic *salann* and Welsh *haln* (all meaning

[1] In another entry (15.36, on European adjectives meaning 'salt, salty') Buck gives the following facts: 'Most of the adjectives for 'salt' are derivatives of the inherited substantives for 'salt' [...]. Latin *salsus* [...], ONorse *saltr* [...], OEnglish *sealt* [...], MEnglish, NEnglish *salt* (late MEnglish *salti*, NEnglish *salty*) [...], earlier NHigh German *salz*, now *salzig* [...].'

[2] See also the entry on *salt* in Mallory and Adams 1997.

'salt'), as well as in numerous other derivatives and compounds meaning 'salty' or 'salted food': Greek *halmurós*, Latin *salsus* (> Spanish *salsa*, French *sauce*), Old Church Slavonic *slanŭ*, etc. The solid position of the Germanic lexical family that refers to salt is well represented in the AHDEL appendix of Indo-European roots, under **sal-¹*. Actually, what is quite visible in that case is that the most important Germanic terms of the **sal-* family are based on an 'extended form' of the respective root, namely on **saldo-* (with a dental suffix), which directly accounts for Gothic *salt*, English *salt* (Old English *sealt*), German *Salz* (Old High German *salz*), etc. Other Germanic terms (Old High German *sulza* 'salt marsh', Scandinavian *sylt* 'salt marsh' and English *silt*) are presented in the AHDEL appendix as based on a 'Germanic ablaut variant form **sult-jō-*.'

In following Pokorny 1959,[3] the same appendix includes, as a separate root, **sal-²* 'dirty gray', an extension of which (**sal-wo-*) appears to be the base of 'Germanic *salwaz*', visible in Old English *salu* 'dusky, dark',[4] which accounts for English *sallow,* given in Hoad 1993 as *sallow²* 'of a sickly or brownish yellow'.[5] What Hoad presents, in a separate entry, as *sallow¹* 'willow' would appear to be connected neither with the colour-name *sallow²*, nor with *salt*. In fact, generally, such connections have been either overlooked or directly dismissed, as indicated below.

We are of the opinion that Germanic evidence indicates etymological connections not only between English *sallow¹* and *sallow²*, but also between these and the vast lexical family that depends on **sal-* 'salt'. Such connections are not indicated in the AHDEL appendix, which, besides the above-mentioned**sal-¹* and **sal-²*, gives, separately, a root **salik-* 'willow' (which accounts for Latin *salix* 'willow'), with a variant **salk-*, reconstructed as to account for Old English *sealh* and for Old High German *salaha*, the last two terms representing names for the species of willow now known as *sallow* in English and *Salweide* (a compound with *Weide* 'willow' as second element) in German. Let us also mention that Chantraine (1990), in his entry on Greek *helíkē* (ἑλίκη) 'a species of willow, *salix fragilis*', states that 'it is tempting to refer it to Latin *salix*, Old High German *salaha*, Old English *sealh*' (our translation). In that context, Chantraine, on the one hand, suggests no possible connection between the tree-name under discussion and Greek *hals* (ἅλς) 'salt',[6] neither does he suggest, on the other hand, any connection with the dirty-gray colour mentioned above. However, such etymological links must have been propounded in earlier times, as we may conclude from some statements of a specialist in German 'geographic names.'

In his entry on *Saale* (the name of a tributary of the Elbe), Berger (1993, 229) mentions that the respective river-name was first presented by Strabo (in the second century of our time) as *Sálas potamós*. In regard to etymology, Berger's opinion is that *Saale* is based on a PIE root **sal-* ('brook, running water'), which might also account for Old Prussian s*alus* 'torrent' and Latin *salum* (the one we already mentioned above). In the next entry, on the river-name *Saalach*, Berger expresses his doubts about certain 'earlier' etymological interpretations of German geographic names of the *Saal-* family: 'The earlier most frequently presumed connection between the names taken into consideration here and PIE **sal-* 'salt' or PIE **sal-* 'dirty gray' count as less probable nowadays' (our translation). Nevertheless, we consider that one can hardly regard the connection between German *Saalach* and **sal-* 'salt' as improbable,[7] especially since Berger himself, in the same entry, refers *Saalach* to a *Salzach* 'near Salzburg' – and *Salzaach* literally means 'salt-brook'. As for the possible connection between **sal-*'salt' and **sal-* 'dirty gray', we should have a look at the entries on *Salz* 'salt' and *Salweide* 'sallow' in two of the most important etymological dictionaries of German.

For German *Salz* Kluge's dictionary (ed. 1995, with Seebold's revisions and additions) provides the following etymological statements (our translation and square brackets):

> **Salz** ['salt']. Derived from Germanic **salt-a-* 'to salt'. The base is PIE **səl-* 'salt' [...]. The original meaning of **səl-* is 'sediment, deposit' [*Bodensatz*]. The sea-salt obtained by evaporation could be designated as

[3] Pokorny 1959 gives '1. *sal-* 878' and '2. *sal-* 879' as separate roots.

[4] At this point we may mention the 'success' of two Germanic terms on Gallo-Roman soil: first, as indicated by Baumgartner and Ménard's etymological dictionary of French (1996, s.v. *sale*), the French term *sale* 'troubled, tarnished, dirty' comes from a Frankish **salo*; second, as indicated in the same dictionary (s.v. *saule*), the existence of today's French tree-name *saule* 'sallow' demonstrates that the Frankish tree-name **salha* 'ousted Old French *sauz, saulx*, from Latin *salix, salicis* 'sallow'' (our translation).

[5] For that 'sickly' colour Romanians will use the adjective *pământiu*, a derivative of *pământ* 'earth'.

[6] In fact, in their etymological dictionary, in the *salix* entry, Ernout and Meillet (1985) also suggest no connection between Latin *salix* 'willow' (from which Romanian has *salcie* 'willow') and Latin *sāl* 'salt'. (As for the connection between Latin *salix* and the names of the same tree in other European languages, the same entry contains rather complicated explanations and reconstructions.)

[7] It appears that the authors of a comprehensive German 'universal dictionary' (DUW 2001) did not share Bergen's doubts at all: at the very beginning of the entry on *Salz* 'salt' they explain the original (actually prehistoric) meaning of the German noun under discussion as 'the dirty-gray one' (*das Schmutziggraue*). What we found as really impressive in the same dictionary is that it contains no less than 41 separate entries on German derivatives and compounds containing *Salz*. Here they are: *Salzader; salzarm; Salzbad; Salzbelastung; Salzbergbau; Salzbergwerk; Salzbrezel; Salzbrötchen; salzen; Salzfass; Salzfleisch; salzfrei; Salzführend; Salzgarten; Salzgehalt; Salzgewinnung; Salzgurke; salzhaltig; Salzhering; salzig; Salzigkeit; Salzkartoffel; Salzkorn; Salzkruste; Salzlagerstätte; Salzlake; Salzlecke; salzlos; Salzlösung; Salzmandel; Salznapf; Salzpflanze; Salzsäule; Salzsäure; Salzsee; Salzstock; Salzstreuer; Salzteig; Salzwasser; Salzwiese; Salzwüste.*

> such [...]. The base is an *l*-stem of a verb **sē-lsə-* 'to deposit, to be laid down' [...].

We have our doubts about the reconstruction that makes **səl-* (that is, the root other linguists presented as **sal-* 'salt') appear as originally meaning 'sediment'; we must also observe that the Kluge/Seebold dictionary makes no reference to any possible connection between *Salz* and *Salweide* (=*sallow*, for a species of willow). The latter term is presented, in the respective entry of the same dictionary, as ultimately based on the 'Indo-European (West-European)' root **salik-*, that is, the one also visible in Latin *salix* (see above). The same entry indicates, however, that the tree-names of the category under discussion had to do with certain shades of gray (our translation):

> Since the name of that tree often occurs in combination with names of colours (cf. Latin *salix cāna* 'the gray willow', Lithuanian žil-vitis 'gray-willow'), a connection with Old Irish *salach* 'dirty', Germanic **salwa-* 'dark' is possible. The latter [is visible] in Old Norse *sǫlr*, Old English *salu*, Old High German *salo*, Modern English *sallow*, Modern Swedish *sälg*.

We consider that Germanic lexical material of direct importance for this article is much more credibly interpreted in another dictionary, namely Pfeifer 2004.

In his *Salz* entry, Pfeifer begins by stating that, in contrast with other European words for salt (Greek *hals*, Latvian *sāls,* Russian *sol',* etc.) the Germanic words for the same mineral indicate an origin in an extension of **sal-,* by a 'dental element' (*-d*). Then, without any reference to Kluge's view, Pfeifer (2004, s.v. *Salz*) unhesitatingly makes the following statement (our translation):

> The basis is the root mentioned under *Salweide*, namely **sal-* 'dirty gray', which – since salt was also used in its unbleached state – also functioned as a substantive for 'salt, sea-salt'.

Obviously, Pfeifer's entry on the German tree-name *Salweide* actually 'unifies' the two seemingly distinct roots with one and the same form, **sal-* (as presented by Berger). We consider that not only linguistic arguments, but also extra-linguistic ones (see below) sustain Pfeifer's idea that European names of the mineral known as *sāl* in Latin and *salt* in English reflect the name of a peculiar colour. There is nothing unusual in such a connection, if we think of the fact that the Latin word for silver, *argentum*, originally referred to the shiny aspect of that metal (which accounts for an etymological connection with Greek *argos* 'clear, brilliant', as indicated in Ernout and Meillet's dictionary, s.v. *argentum*), or of the fact that in Germanic, Baltic and Slavic the terms for gold quite obviously depend on designations of the colour yellow, as specific to that metal (see the *Gold* entry in Pfeifer 2004).

We are of the opinion that the root **sal-,* for 'a species of willow (*salix fragilis*)', for the colour defined as 'dirty gray' as well as for 'salt', should be regarded as Old European rather than as Proto-Indo-European. Also, as suggested above, we are inclined to believe that the root under discussion is different from the (probably Proto-Indo-European) root visible in Sanskrit *salilá-* 'sea, flood' and in Latin *salum* 'open sea' (see above). A good clue to the way in which the name of a dirty-gray colour (specific to the leaves of a certain species of willow) could come to function as name of a mineral is provided by Pfeifer's reference to salt as 'unbleached' (*ungebleicht*). Whereas Pfeifer, in that context (2004, s.v. *Salz)*, expressly refers to sea-salt (*Seesalz*), we consider that, originally, the **sal-* root was applied by Old Europeans to rock salt. Certainly, with regard to precedence, we must take into consideration that prehistoric inhabitants of Europe must have become aware first of the special grayness of the backs of sallow leaves, before they started to exploit rock salt. Nevertheless, that kind of exploitation is of respectable age, too.

Regarding Southeast Europe, the finds from the site of Provadia-Solnitsata (Bulgaria) indicate that, during the Chalcolithic Age, there was exploitation of 'the only deposit of rock salt in the eastern Balkan peninsula', and also that 'salt production in the late Neolithic (5400-5000 BC) was carried out by means of boiling brine from the salt water springs' (Nikolov 2011, 59). In another corner of Europe, at the foot of the outcrops of rock salt of Cardona (Spain), a team of archaeologists traced 'a large number of stone tools, the majority of which aimed at salt extraction.' The archaeologists who were active at Cardona drew the following conclusion: 'The morphological study of these artifacts combined with the wear and fracture studies enabled us to characterize the first European techniques of rock salt's exploitation during the Middle Neolithic [4500-3500 BC]' (Weller, Figuls and Grandia 2007: 115).

Many of the examples given above indicate that salt terminology based on **sal-* occurs in practically all European branches of the Indo-European family of languages. However, we focused mainly on Germanic languages since they appear to be richest in terms that represent the root under discussion, with all its basic meanings. In regard to the interdisciplinary side of our article, although we are inclined to see that the colour originally designated by **sal-* was the special dirty gray of rock salt, we will not overlook the fact that at least one Germanic word of the **sal-* family, namely the English adjective *sallow*, refers rather to a brownish-yellow colour. In such a case, we might also think not only of sickly-coloured faces, but also of the peculiar

colour of the *huscă*,[8] that is, of the salt traditionally produced by boiling natural brine, in the Eastern-Carpathian area of Romania. It is in that area – just as in the case of the Bulgarian area mentioned above – where archaeologists proved that people of the Chalcolithic Cucuteni B culture already knew how to obtain salt from brine (Nicola et al. 2007: 51). Let us hope that further collaboration between linguists, archaeologists and ethnologists will lead to better understanding of the European prehistory of salt.

References

Alexianu, M., Weller, O. and Curcă, R.-G. (eds.) 2011. *Archaeology and Anthropology of Salt: A Diachronic Approach*. Oxford, British Archaeological Reports International Series 2198.

Baumgartner, E. and Ménard, Ph. 1996. *Dictionnaire étymologique et historique de la langue française.* Paris, Le Livre de Poche.

Berger, D. 1993. *Geographische Namen in Deutschland*. Mannheim, Dudenverlag.

Buck, C. D. 1988 (1949). *A Dictionary of Selected Synonyms in the Principal Indo-European Languages*. Chicago/ London, University of Chicago Press.

Chantraine, P. 1990. *Dictionnaire étymologique de la langue grecque*. Paris, Klincksieck.

Dumitroaia, G. and Monah D. (eds.) 2008. *Sarea – de la prezent la trecut*. Piatra-Neamţ, Editura Constantin Matasă.

DUW 2001. *Deutsches Universalwörterbuch*. Mannheim/ Leipzig/ Wien/ Zürich, Dudenverlag.

Hoad, T. F. 1986. *The Concise Dictionary of English Etymology*. Oxford/ New York, Oxford University Press.

Kluge, F. 1995. *Etymologisches Wörterbuch der deutschen Sprache*, E. Seebold (ed.). Berlin/ New York, Walter de Gruyter.

Mallory, J. P. and Adams D. Q. (eds.) 1997. *Encyclopedia of Indo-European Culture*. London/ Chicago, Fitzroy-Dearborn.

Mallory, J. P. and Adams, D. Q. (eds.) 2006. *The Oxford Introduction to Proto-Indo-European and the Proto-Indo-European World*, Oxford University Press.

Monah, D., Dumitroaia, G.,Weller, O. and Chapman J. (eds.) 2007. *L'exploitation du sel à travers le temps*. Piatra-Neamţ, Editura Constantin Matasă.

Morris, W. (ed.) 1973. *The American Heritage Dictionary of the English Language* (with an appendix of Indo-European roots). New York, American Heritage Publishing.

Nicola, D., Munteanu, R., Garvăn, D., Preoteasa, C. and Dumitroaia, G. 2007. Solca-Slatina Mare (Roumanie). Preuves archéologiques de l'exploitation du sel en préhistoire. In D. Monah, Gh. Dumitroaia, O. Weller, J. Chapman (eds.), *L'exploitation du sel à travers le temps*: 35-56.

Nikolov, V. 2011. Provadia-Solnitsata (NE Bulgaria): A Salt-Producing Center of the 6th and 5th Millennia BC. In M. Alexianu, O. Weller and R.-C. Curcă (eds.), *Archaeology and Anthropology of Salt: A Diachronic Approach*: 59-64. Oxford, British Archaeological Reports International Series 2198, Achaeopress.

Pfeifer, W. et al. 2004. *Etymologisches Wörterbuch des Deutschen*. München, Deutscher Taschenbuch Verlag.

Pokorny, J. 1959. *Indogermanisches etymologisches Wörterbuch*. Bern, Francke.

Poruciuc, A. 2007. Romanian *huscă* ('salt obtained by evaporation of salt water') explained as an Old Germanism. In D. Monah, Gh. Dumitroaia, O. Weller, J. Chapman (eds.), *L'exploitation du sel à travers le temps*: 319-324.

Poruciuc, A. 2008. Denumirile sării şi implicaţiile lor în plan (indo)european. In Gh. Dumitroaia and D. Monah (eds.), *Sarea,De La Prezent La Trecut*: 133-148. Piatra-Neamţ, Centrul Internaţional de Cercetare a Culturii Cucuteni Piatra-Neamţ.

Poruciuc, A. 2011. Etymological and historical implications of Romanian place names referring to salt. In M. Alexianu, O. Weller and R.-. Curca (eds.), *Archaeology and Anthropology of Salt: A Diachronic Approach. Proceedings of the International Colloquium*: 215-218. Oxford, British Archaeological Reports International Series 2198, Archaeopress.

Weller, O., Figuls, A. and Grandia, F. 2007. Première carrière de sel gemme européenne: le *Vall Salina* à Cardona (Catalogne, Espagne) au Néolithique moyen (4500-3500 BC). Technologie, minéralogie et pétrographie de l'outillage lithique. In D. Monah, Gh. Dumitroaia, O. Weller, J. Chapman (eds.), *L'exploitation du se là travers le temps*: 115-134.

[8] See Poruciuc 2007, in which Romanian *huscă* is presented as a probable Old Germanic loan.

Imagery of Salt in Romanian Phraseology. Cultural Aspects (Romania)

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Abstract

This paper aims to describe the connection between Romanian phraseological structures based on image of salt (such as idioms, proverbs, etc.) and culture. Numerous studies have revealed the fact that phrasemes are not only units of a sign system, language, but also carriers of cultures, pointing out the necessity for modern phraseological research to turn to cultural phenomena. To explore this connection, one has to consider both the literal and the figurative readings of salt phrasemes, as well as the different levels of describing phrasemes, since there are various ways in which the cultural aspects may become manifest.

Keywords: Salt, imagery, culture, Romanian, phraseology.

Introduction

Numerous studies have revealed the fact that phraseological structures are not only units of a sign system, language, but also carriers of cultures, pointing out the necessity for modern phraseological research to turn to cultural phenomena. Although there is general agreement on the fact that culture plays an important role for most phraseological issues, only a few studies have actually treated the relation between phraseology and culture in detail. We agree with the statement made by Piirainen (2007) according to which there can be no adequate description of phrasemes and the way they function in a language without regard to culture, since in many cases culturally based concepts govern the inference from literal to figurative.

In this article, we shall attempt to analyze the way in which representations related to salt, on which Romanian phraseological structures rely, generate real paradigms of meaning depending on the position that substance occupies in the culture-nature relationship. To explore this connection, one has to consider both the literal and the figurative readings of salt phrasemes, as well as the different levels of describing phrasemes, since there are various ways in which the cultural aspects may become manifest. The present study employs a wide conception of *phraseology*, a conception that most European phraseology researchers agree on today (cf. Burger et al. 2007). Phraseology is understood here as the totality of fixed multi-word units of a language (formulaic expressions that are elements of the lexicon and that go beyond the level of a single word but do not go beyond sentence level).

The corpus of Romanian phraseological structures that is based on our study has been taken from Iuliu Zanne's (1895-1912) monumental collection *Proverbele românilor din România, Bucovina, Ungaria, Istria* şi *Macedonia. Proverbe, zicători, povăţuiri, cuvinte adevărate, asemănări, idiotisme* şi *cimilituri cu un glosar româno-frances*, together with both the old and new series of the most important work of Romanian lexicography, *Dicţionarul limbii române*. Other lexicographic sources used were: *Dicţionar român-german*, by H. Tiktin, *Dicţionarul universal al limbii române*, by Lazăr Şăineanu, *Dicţionarul limbii române literare contemporane* and also *Micul dicţionar academic*.

Considering that we aim to subordinate our scientific study to the cultural approach by presenting the relation between the 'knowledge about things' and their representation in the fixed language structures, the phraseological corpus study will be prefaced with a brief mythology monograph of the salt image in Romanian culture.

Salt in Romanian popular mythology

In daily food, salt is indispensable; physiologically, man needs only five to six grams per day, which are generally contained in food, the rest added according to taste. So, as spice, it has a profound cultural value. But, by its role in the preservation of food, salt has always been an important factor in man's survival. In addition to its food value, salt is very important in many other technical activities: pottery, soap production, glass, steel, tanning, preservation of fodder etc. However, in the popular mythology, salt is, obviously, most often represented as a food.

Acknowledging this substance (starting from its practical relevance for food) as an expression of a manifestation of general notions of mentality is shown by the processing of the motif 'salt in food' in the

fairy tales of many peoples. Lazăr Şăineanu recorded versions in Romanian, Breton, Gascon, Walloon and Italian (Şăineanu 1978: 112). Misunderstanding the value of salt is the fundamental motif of these tales, the image of salt appearing as the essential element which gives taste to things.

According to old Romanian beliefs, 'salt is the manna of God', 'salt is justice', that is why 'if you steal salt from somebody's house, you take away the comfiture, the profit of the house' (Niculiţă-Voronca I 1998: 153-154). In this context, salt is part of the gifts ritual for prosperity and luck: in Tecuci, to honour the Fortune tellers, there is placed on a round table a plate with 'money, bread, salt, a glass of wine, two candles and a few stems of basil' (Pamfile 2006: 493). On the occasion of baptism, the godparents would give the priest 'a block of salt and a small bottle of brandy' (Marian, *Naşterea*, 179 apud TDRG I: 744). Even nowadays, at Solca (Suceava county), when a house is being consecrated, through a ceremony performed by the Orthodox priest, salt and a coin are placed in each of all four orifices from the corners of the house to assure the family prosperity (Alexianu *et al.* 2008: 19).

Positively exploited, salt occurs most often in combination with bread, being used in the rites of telling the fated one, of communion, of befriending and of hospitality. For the Romanian, eating bread and salt from the same plate is a sign of perfect harmony and peace between spouses (Ciauşanu 2007: 229). It is believed that the strongest oath for Romanians is swearing on bread and salt (Ciauşanu 2007: 230). That is why, in popular beliefs, the enemy will never eat bread and salt in your house because 'there's no other thing in the world able to punish the guilty like bread and salt' (Niculiţă-Voronca I 1998: 154).

Salt is also used in rituals to ensure prosperity and abundance: before the bulls that plough the land, bread and salt are put on the first furrow, for rich crops (Gorovei 1915: 20); at Christmas, shepherds place a wrapped block of salt on the doorstep and keep it there until the *Separation of sheep* (22nd of April) when they unwrap it, grind and mix it with bran, which they give to the sheep for their health and growth of the flock (Antonescu 2016: 584); in performing the traditional dance of *Căluşul*, the performers dance around a block of salt and a tuft of wool to bring abundance to herds (Antonescu 2016: 150).

The value of salt in the Romanian mind is also confirmed by a number of taboos related to its use: 'Who will throw salt into fire will gather it with his eyelashes in the other world', 'if he steals from your salt for cattle he will have poor cattle himself', 'when you give salt from the house on Monday it will not right for your cattle will die' (Zanne IX: 367). Salt is part of foretelling rituals. To foretell weather in the coming year, on New Year's Eve twelve onion peels are filled with salt, representing the months of the year, and those with most water on the morning of the New Year will be the rainiest month (Gorovei 1915: 367). Also, it is said that 'when salt gets wet it will rain', 'if salt or pepper is spilled during mealtime there will be quarrel in the house' and 'if you put salt on a pregnant woman's head without her knowledge, and if after that she touches her nose with her hand, she will give birth to a boy, and if she touches her mouth, she will give birth to a girl' (Zanne IX: 367). Also, salt cake eaten on the evening of St. Andrew by unmarried girls will make their fated one appear in their dreams, quenching their thirst (Pamfile 2006: 227).

Salt is regarded as an apotropaic element: 'When you undo a spell of illness from somebody and there is a small child in the house, you should spread salt or ashes over the child's head so that the child may not get the illness', 'salt in the shoe so that the spells may be kept away' (Candrea 1999: 262), 'spread holy salt over the door steps to keep away the Evil one', 'at night you should keep the salt on the window sill so that you may sleep well and no evil may come near you' (Niculiţă-Voronca I 1998: 153-154), 'when the fire is howling, then someone speaks ill of you, you should take salt and throw it into the fire because in this way you hit the one who speaks ill of you in the eye' (Gorovei 1915: 119), 'when milk overflows into the fire, add some salt, so that the cow's udder may not crack' (Gorovei 1915: 348).

Salt has always been invested with negative valences, a result of its destructive action when in large quantities. Due to its ambivalence, it may also drive away good spirits: 'When a baby is born in the house, the salt will not be put on the window-sill for the angel will not be able to come as the path is salted' (Niculiţă-Voronca, I 1998: 154).

Salt can also be used in black magic to cause harm: 'A small block of salt is placed in the mouth under the tongue to a dying man; on the third day, it is taken out of the mouth. A pinch of salt added to brandy or something else will cause somebody's death without knowing why' (Zanne IX: 367).

Salt in Romanian phraseology

Salt is a substance with deep implications at the level of collective existence, given the complex register of its uses. The Romanian phraseology that contains the image of this ingredient makes use both of its ritualistic and also daily component.

Structures such as *a mânca pâinea* şi *sarea cuiva* (to eat somebody's bread and salt) (Zanne IV: 58), *a mânca*

sare în *casa cuiva* (to eat salt in somebody's house) 'to be received in somebody's house; to enjoy somebody's benevolence' (Zanne, IV: 109),[1] *a mânca pâine* şi *sare cu cineva* (to eat bread and salt with somebody) 'to live together, with somebody, in a house; to have close connections of friendship and mutual obligations' (Zanne, IV: 58) may also rely upon popular beliefs related to the role of the two foods, bread and salt, in rituals of befriending, communion. The last expression has, nevertheless, a pragmatic correspondent *Trebuie să mănânci un car cu sare cu cineva ca să-l poţi cunoaşte* (You have to eat a cartful of salt together with somebody so that you may get to know him) 'it is very difficult to know very well the best hidden thoughts of a man' (Zanne IV: 105).

The expression *a-i ieşi* înainte *cu pâine* şi *cu sare* (to welcome with bread and salt) 'to welcome with special homage' (Zanne IV: 58) is based on the ritualistic act of welcoming guests, common in Romania and Southeastern Europe. The structure *Sare*, *până nu cere*, *să nu dai cuiva* (You should not give salt to somebody before he asks for it) 'meaning advice' (Zanne IV: 107) may be related to the popular customs of not giving away salt regarded as the 'comfiture' or the 'profit' of the house.

Alone or with bread or polenta, salt may symbolize the minimal conditions for existence: *Mai bine să mănânc sare* / Şi *să mă uit la soare*, / *Decât unt* / Şi *să mă uit la pământ* (Better eat salt / And look towards the sun, / Than butter / And look towards the ground) 'about love and understanding between spouses' (Zanne IV: 106), *nici sare cu pâine gustă* (he won't even taste bread and salt**)** 'is said about those who are very high and miserly' (Zanne IV: 107), *a nu avea sare de mămăligă* (to have no salt for polenta) 'to be very poor' (DLRLC), *pâine cu sare e gata mâncare* (bread and salt ready to eat) 'about somebody who lives in poverty; about someone who lives on few resources' (Zanne IV: 45-46).

The expression *sarea pământului* (the salt of the earth) 'the essence of something; what is most precious, most valuable in something' (MDA IV) is of Biblical origin. Jesus calls his apostles 'the salt of the earth' (Matthew, 5, 13), the salt's preservation power being symbolically transposed in the unaltered keeping of the divine word. The phraseological structures *a pune sare-n bucate* (to put salt in food) 'to be eloquent', *a fi ca sarea* în *bucate* (to be like the salt in the food) 'to be nice, balanced' (Zanne IV: 109-110) reveal the value of this food that is defining for taste and also represents an image of balance and eloquence. To the same register belongs the saying *Nu e meşteşug a găti o mâncare, ci e meşteşug a o potrivi de sare* (There's no artistry in cooking food but there is artistry in putting the proper amount of salt in it) 'for those who do not speak becomingly' (Zanne IV: 105). The presence of salt in most foods turns into an image that lies at the basis of the expression *a se amesteca* în *toate ca sarea* în *bucate* (to interfere everywhere like salt in food) 'when somebody meddles with everything, especially where it's none of his business' (Zanne IV: 110). In many phraseologies, salt is a gauge of just measure: *Cum vei săra bucatele tale*, *aşa le vei mânca* (You will eat your food with the salt that you have put into it) 'meaning that one's acts will be rewarded accordingly' (Zanne IV: 103), because *Sarea-i bună la fiertură*, / Însă *nu peste măsură* (Salt is good in the stew, / But not without measure) 'there should be a balance in all things, especially in speaking', *Sarea nu e bună* în *toate bucatele* (Salt is not good in all foods) 'even the best things are not fit for everything', *Cine are sare multă pune* şi în *chisăliţă* (The one that has too much salt will add it even to the compote) 'about the spendthrift' (Zanne IV: 106-107). Nevertheless, salt generally remains an image for wisdom: *Puţintică sare pururea* în *tivgă să păstrezi curată* (You should always keep some clean salt in the gourd) 'meaning brains in the head' (Zanne IV: 107).

The appellative *sărat* 'salted' is subordinated to the same area of signification. *A fi sărat* (to be salty) means 'eloquent, smart; full of grace, charm and taste' (Zanne IV: 104), whereas *a fi nesărat* (to be unsalted) (Zanne IV: 104) means the opposite, similarly to the way in which *parcă n-o mâncat sărat* (it is as if he has had no salt in his food) means that 'he's a slowcoach, gawky and drowsy; is said about the one who has the occasion but does not show interest in girls' (Zanne IV: 104). Exceeding the measure confers negative connotations to the attribute *salty*: *e prea sărat* (it's too salty) 'meaning too expensive', *sărat* şi *piperat* (salty and peppered) 'bad man' (Zanne IV: 104).

There is, however, awareness of the fact that salt burns, which is why it may drive good spirits away. The expression *cu mâna de sare* (with a hand of salt) 'with no luck' is such an illustration: *Câte flori pe iaz în sus, / Toate cu mândra le-am pus, / [...] Le-am pus cu mâna de sare / Şi nici una nu răsare* (The many flowers up by the pond, / That my darling and I planted, / [...] We planted them with a hand of salt / And none of them has sprung) (Jarnik - Bîrseanu, cf. DLRLC IV).

Salt burns, hence its antiseptic value, therefore unprotected contact with human tissues causes pain. Physical pain is a hyposthasis of unpleasantness, hence *a-i fi* (or, regionally, *a-i avea*, *a-i sta* etc.) *cuiva* (*drag*) *ca sarea în ochi* [to be (or, regionally, to have, to sit like etc.)

[1] Concerning the phraseological structures taken from Iuliu Zanne's collection, we have generally used the author's explanations who, for his part, has frequently made use of those given by the sources he used (e.g., Iordache Golescu), respectively by the references that communicated them to him. For these reasons, the explanations reflect different styles. After each phraseological unit of the Romanian language, we note between parentheses the literal translation, and between quotes, the meaning of the structure.

as dear as salt in somebody's eyes] means 'to be repugnant, obnoxious, to loathe (someone)' and a *pune* (sau *a turna*) *sare pe rană* [to put (or pour) salt on the wound], 'to cause someone pain or irritation, by refreshing a sensitive issue, insisting on it etc.' To the same range also belongs the expression *a-i pune* (sau *parcă i-a pus*) *sare pe coadă* [to put (or as if he had been put) salt on his tail], which the DLR X/1 explains as 'saying about somebody who got/ was made angry' and by the DLRLC as 'said about someone who left and who can no longer be caught or about something that was taken and can no longer be found'. We may believe that we are dealing with an evolution of the meaning of the expression originating in the same image of burning salt for anger and tempestuous distancing.

Salt is also part of the diet of many animals, but in the form of blocks it is given only to cattle, horses and sheep. Therefore, the idea of unpleasant things is epitomized by the block of salt that is fed to other animals, for instance dogs. Thus, the meaning of the expression *a (nu)-i fi cuiva de ceva* sau *a (nu)-i veni cuiva să facă ceva cum (nu) îi este câinelui a linge sare* [(not) to feel like doing something in the way that a dog does (not) feel like licking salt] means 'to not want, to not feel like doing a (necessary) thing (DLR X/1). A whole philological polemic,[2] has generated the expression *a făgădui marea cu sarea* (to promise the sea with the salt) 'they say when someone promises over what is possible' (Zanne I: 211-212). Sextil Puşcariu's opinion (dating from 1922) is that the origin of the phrase is linked to the fact that some of our ancestors reached the western regions close to the Albanians. The argument is that in today's Romania, the sea is far away, and salt is everywhere, and such a phrase could not have been born here, 'its genesis may be explained in the northwest of the Balkan Peninsula, where salt is extracted from the Adriatic Sea, being an object difficult to obtain and as precious as gold' (Puşcariu 1976: 252-253). This opinion was supported, with certain amendments, by A. Philippide (1927: 45) and G. Ivănescu (1980: 362). This explanation was opposed by Leo Spitzer (1937: 190-195), who argued that the phrase has a stylistic explanation, considering it exclusively the result of phonetic symmetry, a proof of this also being the version in which the structure is continued with the syntagm şi *Oltul cu totul* (and the Olt River altogether). The stylistic explanation is also supported by Iorgu Iordan (1975: 91) and Stelian Dumistrăcel (2001: 224-225). According Stelian Dumistrăcel, an additional argument to contradict the hypothesis that the image of the expression may have been formed at the Romanians south of the Danube is the presence of the Hungarian origin word *a făgădui* 'to promise' (it is known that south of the Danube, Hungarian loans are insignificant). We agree with the opinion of Leo Spitzer, I. Iordan and Stelian Dumistrăcel, in that we believe phonetic symmetry was essential in the formation of the expression, but affirm our belief that the expression is constituted based on a completely grounded semantic principle, that of hyperbolization. The meaning of the idea implies the understanding of the sense of totality for the entire structure: *a făgădui* [toată] *marea cu* [toată] *sarea* [ei] şi *Oltul cu totul* (to promise [all] the sea with [all its] salt and [all] the Olt River altogether). The expression above is evidence of the stake represented by elucidating the relationship between the meaning of an expression and the underlying cultural realities.

[2] A whole series of debates in Romanian linguistics on the origin of this expression are presented in this volume, in the article Petronela Savin, *The biography of the Romanian expression 'a făgădui marea cu sarea'.*

Conclusions

Salt is a substance with deep implications on the level of the Romanian collective imaginary, given the complex register of its uses. In popular mythology, salt has two major lines of signification, one given by its quality as flavour enhancer and preservative for food and one generated by its status of an element that destroys through corrosion. Thus, its symbolism applies both to the law of physical transformation and also to moral and spiritual transformation; from this perspective, it embodies, on the one hand, the power and taste of the earth, the defence against degradation, the purifying element and, on the other hand, burning, sterility, bitterness. Therefore, in phraseology, salt is generally associated with the principle of good, being an image of just measure and of the conditions that are indispensable for living, as well as an image for suffering, being directly linked to the idea of corrosion.

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References

Alexianu, M., Weller, O., Brigand, R. Curcă, R.-G., Cotiugă, V. and Moga, I. 2011. Salt Springs in Today's Rural World. An Ethnoarchaeological Approach in Moldavia (Romania). In M. Alexianu, O. Weller and R.-G. Curcă (eds.), *Archaeology and Anthropology of Salt: a Diachronic Approach, Proceedings of the International Colloquium, 1-5 October 2008 'Al. I. Cuza' University (Iaşi, Romania)*: 7-23. Oxford, Archaeopress.

Antonescu, R. 2016. *Dicţionar de simboluri şi credinţe tradiţionale româneşti*. Iaşi, Editura TIPO Moldova.

Burger, H., Dobrovol'skij, D., Kühn, P. and Norrick, N. R. (eds.) 2007. *Phraseologie/Phraseology: Ein internationales Handbuch zeitgenössischer Forschung/ An International Handbook of Contemporary Research* 1. Berlin, Walter de Gruyter.

Candrea, I.-A. 1999. *Folclor medical român comparat. Privire generală. Medicina magică*. Iaşi, Editura POLIROM.

Ciauşanu, Gh. F. 2007. *Superstiţiile poporului român în asemănare cu ale altor popoare vechi şi noi*. Bucureşti, Editura SAECULUM I. O.

Dobrovol'skij, D., Piirainen E. 2005. *Figurative Language: Cross-cultural and Cross-linguistic Perspective*. Amsterdam, Elsevier.

Dumistrăcel, S. 2001. *Până-n pânzele albe. Expresii româneşti*. Iaşi, Editura Institutul European.

Gorovei, A. 1915. *Credinţi şi superstiţii ale poporului român*. Bucureşti-Leipzig-Viena, Librăriile Socec & Co., C. Sfetea, Pavel Suru, Otto Harrassowitz, Gerold & Comp.

Iordan, I. 1975. *Stilistica limbii române*. Bucureşti, Editura Ştiinţifică.

Ivănescu, G. 1980. *Istoria limbii române*. Iaşi, Editura Junimea.

Niculiţă-Voronca, E. 1998. *Datinile şi credinţele poporului român adunate şi aşezate în ordine mitologică* I, II. Iaşi, Editura POLIROM.

Pamfile, T. 2006. *Mitologia poporului român*. Bucureşti, Editura VESTALA.

Philippide, A. 1927. *Originea românilor* II. Iaşi, Tipografia 'Viaţa Românească'.

Piirainen, E. 2007. Phrasemes from a cultural semiotic perspective. In H., Burger, D., Dobrovol'skij, P., Kühn and N. R., Norrick (ed.), *Phraseologie/Phraseology: Ein internationales Handbuch zeitgenössischer Forschung/ An International Handbook of Contemporary Research* 1: 208-219. Berlin, Walter de Gruyter.

Puşcariu, S. 1976. *Limba română. I. Privire generală*. Bucureşti, Editura Minerva.

Spitzer, L. 1937. L'expression 'a făgădui marea cu sarea'. In *Bulletin Linguistique* V: 190-195.

Şăineanu, L., Niculescu, R. (ed.) 1978. *Basmele române în comparaţiune cu legendele antice clasice şi în legătură cu basmele popoarelor învecinate şi ale tuturor popoarelor romanice*. Bucureşti, Editura Minerva.

Dictionaries

DA = [Romanian Academy] *Dicţionarul limbii române*; I/I, letters *A-B*, Bucureşti, 1913; I/II, letter *C*, Bucureşti, 1940; I/III, volume I, *D-de*, Bucureşti, 1949; II/I, letters *F-I*, Bucureşti, 1934; II/II, vol. I, *J -lacustru*, Bucureşti, 1937; II/III, *ladă - lojniţă* [s.a].

DE = Ciorănescu, A. 2002. T., Şandru-Mehedinţi and M. Popescu-Marin (eds.), *Dicţionarul etimologic al limbii române*. Bucureşti, Editura SAECULUM I.O.

DLR = [Romanian Academy], *Dicţionarul limbii române* (new series), Editura Academiei, t. VI, letter *M* (1965-1968); VII/1, letter *N* (1971); VII/2, letter *O* (1969); VIII/1-5, letter *P* (1972-1984); IX, letter *R* (1975); X/1-5, letter *S* (1986-1994); XI/1, letter *Ş* (1978); XI/2-3, letter *T* (1982-1983); XII/1, letter *Ţ* (1994); XIII/1, letter *V* (*V – veni*; 1997; *venial – vizurină*; 2003); *IV, letter L (L – lherzolită; 2008); V, letter L (Li– luzulă, 2008).*

DLRLC = [Academia Română] 1957, *Dicţionarul limbii române literare contemporane* I-IV, Editura Academiei, Bucureşti.

DU = Şăineanu, L. 1943. *Dicţionarul universal al limbii române*. Craiova, Editura Scrisul Românesc.

Haşdeu, B. P. 1972-1976. G. Brâncuş (ed.), *Etymologicum Magnum Romaniae*. *Dicţionarul limbei istorice şi poporane a românilor*, I-III. Bucureşti, Editura Minerva (Ist edition, vol. I: 1885 [1887], vol. II: 1889, vol. III: 1893 [1895].

MDA = [Romanian Academy] 2001-2003, Linguistics Institute 'Iorgu Iordan', *Micul dicţionar academic*, I-IV, Bucureşti, Editura Univers Enciclopedic.

TDRG = Tiktin, H., *Dicţionar român-german. Rumänisch-deutsches Wörterbuch*. Bucureşti, Staatsdruckerei.

Zanne, I. 1895-1912. *Proverbele românilor din România, Bucovina, Ungaria, Istria şi Macedonia. Proverbe, zicători, povăţuiri, cuvinte adevărate, asemănări, idiotisme şi cimilituri, cu un glosar româno-frances* I-X. Bucureşti, Editura Librăriei Socecu & Comp.

The Morphosyntax of Salt-Related Words, Idioms, Similes and Proverbs in English and Romanian

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Abstract

This paper involves discovering what characterizes the lexical families of the English noun *salt* and of the Romanian noun *sare*, as well as some salt-related idioms, similes and proverbs in the two languages from a grammatical perspective, and mostly draws upon the material contained in several specialized online and paper-based dictionaries and collections. Upon the examination of such grammatical units in English and Romanian, it becomes clear that, while they reflect the expectable differences in the cultures that produced them, they still share other essential linguistic features. Through identifying such instances, this research highlights the grammatical patterns on which they are built in the two languages, as well as their cultural implications.

Keywords: Salt-related words, idioms, similes, proverbs, semantic and syntactic equivalence.

Introduction

Saying that salt is central to any agricultural society and therefore marked the evolution of mankind is only stating the obvious, so that the persistence of references to this mineral in the sayings and proverbs all over the world comes as no surprise. The absence of salt in one's household, for example, was an indicator of extreme poverty in ancient Sumer ('*The poor man is better dead than alive; if he has bread, he has no salt; if he has salt, he has no bread*' (Lockard, 2011, p. 30)). Exactly the same idea is rendered in the Romanian proverb 'În casa săracului, când e sare, nu e făină, când e făină, nu e sare, și când le împreună pe toate, iese apa în vatra focului›. [When the poor man has salt, he finds no flour, when he has flour, he finds no salt, and when he finds both, water floods the hearth].'

However, if the two proverbs above clearly express the same meaning - that the poor almost always lack the basic necessities of life - their derivation is less clear, even quasi-impossible to trace, because equivalent sayings may be identified in other cultures and languages. The same can be said about the derivation of the vast majority of folk dicta, as most of them express truths that transcend the boundaries of countries, languages and even time. The derivation issue was actually raised by Wade as far back as in 1825, in the preface to his collection of world proverbs, in which he noted that '[t]here is nothing so uncertain as the derivation of proverbs, the same proverb being often found in all nations, and it is impossible to assign its paternity' (p. ii), and his observation stands true to this day.

Although the origin of proverbs and other types of proverbial sayings is interesting and relevant to any approach to paremiology, the present paper is primarily concerned with discovering what characterizes the lexical families of the English noun *salt* and of the Romanian noun *sare*, as well as some salt-related idioms, similes and proverbs in the two languages from a grammatical perspective. It subsequently analyses a selection of word classes, idioms and proverbs related to salt in English and Romanian and discusses them from a morphosyntactic perspective with some lexical and cultural observations where appropriate.

The primary materials used in this paper were extracted from dictionaries (*Dicționar de proverbe și zicători românești* / Grigore Botezatu și Andrei Hâncu; București; Chișinău.: Litera, 2001, *Dicționar Englez-Român de proverbe echivalente = English-Romanian dictionary of equivalent proverbs* / Teodor Flonța, Bucharest, Teopa srl, 1992, *Similes Dictionary* / Elyse Sommer, ed., Visible Ink Press, 2013) and internet sources (https://en.oxforddictionaries.com, www.phrases.org.uk, www.oxfordreference.com, www.phrases.org.uk, http://dictionareonline.duv.ro, https://expresiiromanesti.wordpress.com).

Discussion

The lexical families of the English noun *salt* and of the Romanian noun *sare* are comparable in size and include in both languages derived verbs, adjectives, adverbs and other related nouns. They also include chemical and medical terms such as *salinity* (Rom. *salinitate*), *salicylic* (Rom. *salicilic*), *saliferous* (Rom. *salifer*), etc., which, however, will not be considered in this paper that is solely concerned with the range of words belonging to the popular cultures of the two languages.

Thus, in English, the verb *salt* is obtained by zero-derivation from the noun *salt*, the corresponding adjectives and adverbs are formed with derivational

morphemes, while the participle *salted* has the inflectional suffix *-ed* attached to the bare infinitive *salt*. In the formation of the adjectives, this shift follows the derivational pattern noun-to-adjective (the suffixes *-y, -like, -less, -free* added to the noun *salt* to form the adjectives *salty*, *salt-like, saltless* and *salt-free*) and adjective-to-adjective (the suffix *-ish* added to the adjective *salty* to form the adjective *saltish*). The adverbs *saltily* and *saltlessly* follow the adjective-to-adverb pattern that attaches the suffix *-ly* to the adjectives *salty* and *saltless.* The verbs *to desalt, to unsalt*, *to oversalt* and the participles/adjectives *desalted, unsalty*, *oversalty* and *unsalted* additionally use the derivational prefixes *de-*, *un-* and *over-* that turn them into the antonyms of their counterparts (i.e. *to salt ≠ to unsalt, salty ≠ unsalty*). They highlight occurrences of derivational affixes that do not necessarily shift the lexical category, but merely alter the meaning and leave the category unchanged. Another derived noun illustrates the same type of change: the derivational pattern noun-to-noun changes *salt* into *salt* (short for *saltcellar*) through clipping. The agent noun *salter*[1] formed with the suffix *–er* illustrates the verb-to-noun pattern.

The Romanian lexical family of the noun *sare* exhibits similar derivational patterns which involve either suffixes or suffixes and prefixes, i.e. verb-to-verb (*a săra - a desăra*[2] and *a presăra)*[3], verb-to-noun (*săra – sărar,*[4] *sărărit*[5] and *sărărița:*[6] *sărat - sărătură)*[7], noun-to-verb (*sare – a săra* and *a sărui)*[8], noun-to-adjective (*sărătură - sărături)*[9] and noun-to-noun (*sare - sarniță;*[10] *sărar - sărărie)*[11] The participle forms from the bare infinitive *săra, desăra, presăra* with the inflectional suffix*-at/ată* (*sărat/sărată*) and from *sărui* with *-it/ită* (*săruit/săruită*) and is commonly used as the head of adjective phrases. The forms of *a săra* with the derivational negative prefixes *ne-* (*nesărat/nesărată)*[12] and *de-* (*desăra*, *desărat/ desărată)*[13] are, like their analogous forms in English, the antonyms of the base.

The diminutive noun *săricică* obtained by adding the suffix – *icică* to the noun *sare* to express a notion of warmth or affection is yet another example of a derivational suffix that does not shift lexical class. Similarly, -ărie on the countable noun *sărar* forms the collective noun *sărărie.*

An interesting case in Romanian is the formation of the nominal long infinitives that function as feminine abstract nouns which name processes, obtained by postverbal derivation with *–re* on the bare infinitive. Thus, the long infinitives of the verbs *a săra, a sărui, a desăra,* and *a presăra* are *sărare, săruire, desărare,* and *presărare,* respectively.

As we can see from the examples above, some of the patterns are more productive in English, some others are more productive in Romanian, but most of the members of the two lexical families are part of common collocations and other idiomatic structures. For example, in both languages jokes can be described with an adjective derived from the noun *salt*; thus, a *salty joke/humour* is the collocation of the premodifying adjective *salty* and the head noun *joke/humour* and refers to sharp, coarse, sometimes offensive wit, with literally the same sense and syntactic structure as the Romanian collocation of the noun *glumă* postmodified by the adjective *sărată.* However, the idiom *glumă nesărată* that uses the prefixed antonym of *sărată* and refers to a witless flat joke that can be offensive is more frequent in present-day Romanian.

In English, as well as in Romanian, idioms related to salt are recurrent in popular culture and literature alike. In the present paper, the analysis of such phrases draws on the view that defines idioms as words or groups of words whose meanings are different from the literal meaning of their elements considered individually and which can be understood by people sharing the same language and culture. More specifically, an idiom is a 'multiword construction' that forms a 'semantic unit' that 'has a non-productive syntactic structure' and 'often shows the following characteristics: [i] t is syntactically anomalous [...], [i]t has an unusual grammatical structure [...], [i]t contains unique, fossilized items. (SIL-International, 2017).

As we might expect, a number of the most frequently used English idioms that contain the noun *salt* or any of its derivatives have no obvious corresponding item in Romanian; of these, the most representative are *old salt/salty dog* (experienced sailor/good friend), *to be worth one's salt* (to be worth one's pay), *to be below the salt* (to be of lower social rank or worth) and *to salt away/to salt down* (to hoard or save something valuable). Similarly, the following Romanian idioms with *sare* have no English counterpart: *a-și săra inima* (to get satisfaction from revenge), *a-i fi cuiva de ceva cum îi e câinelui a linge sare* (someone is unwilling/loathe to do something), *a se avea ca sarea-n ochi* (to have a poor relationship, to hate each other), *a face pe cineva cu sare si piper* (to scold, to shame somebody), *a făgădui marea cu sarea* (to make unrealistic or insincere promises). This is not to say that idioms with equivalent meanings cannot be identified in both languages for any of the idioms

[1] A person trading/extracting salt.
[2] To desalt.
[3] To sprinkle, to scatter a powder.
[4] A person who trades/extracts salt.
[5] Tax on salt extraction.
[6] 1. (regional) saltcellar. 2. Salt truck.
[7] a highly saline and sodic soil.
[8] A regional variant of *a săra.*
[9] highly saline and sodic.
[10] A saltcellar.
[11] Salt deposit; place where salt is sold. **2.** (reg.) Salt mine. **3.** Salt lick.
[12] Which does not contain (sufficient) salt.
[13] Desalted.

above, but, as they do not contain the words *salt/sare* and/or their derivatives, they do not fall within the scope of this paper.

Instances of almost perfect equivalence of English and Romanian salt-related idioms with interrelated semantics and/or literally the same grammatical structure do exist, though, and they form a set of analogous idioms in the two languages. One example is the verbal locution *to put salt on the tail of something* and its Romanian counterpart *a pune cuiva sare pe coadă*. The syntactic structure of the two idioms is almost identical, involving the verb *put/pune*, the object noun *salt/sare* and a prepositional phrase with the head *on/pe* and the complement *tail/coadă*. Their meanings, however, are somewhat different: 'to capture' in English (with reference to humorous instructions given to children for catching a bird) and 'to miss, to lose sight of, to be unable to capture, to get lost' in Romanian. Slighter semantic variations but more marked structural distinctions can be identified for *to eat someone's salt* (to be somebody's guest, stay at someone's house for free, to derive subsistence from someone) and *a mânca pâine si sare cu cineva.*[14] The same combination of *bread* and *salt* is present in the Romanian *a-i ieși înainte cu pâine și sare*, which reflects the tradition that has survived to this day to welcome valued guests with bread and salt. No differences in structure and meaning can be distinguished between *to rub salt into the wound* and *a pune sare pe rană*[15] (to cause further pain, make a painful experience even more painful for someone), in spite of the lexical difference in the choice of the verbs.

As the result of translation, this same set comprises some salt idioms from the Bible, such as *the salt of the earth/sarea pământului, covenant of salt/legământ de sare* and *pillar of salt/stâlp de sare* that have literally the same syntactical structures[16] in both languages. Leaving aside the question of the biblical sources, it would be safe to say that the translations of the Bible contributed directly to the paremiological minimum[17] of all Christian countries, which in English, as well as in Romanian, includes some salt-related idioms that can be traced back to the shared source and that are used or at least recognized by the native speakers of the two languages.

Salt idioms also come in the form of similes and comparative constructions and sentences. In English, similes are signalled with *like* or *as... as*, while in Romanian by *ca*. The similes that involve *salt* express either the idea of supreme saltiness (*as salt as brine/a sea sponge/the sea-wind* in English and *sărat ca o scrumbie,*[18] *sărat ocnă*[19] in Romanian) or that salt has an inner quality that makes it superior to other materials (*as dear as salt, as abundant as salt in the sea* in English and *drag ca sarea în bucate,*[20] *spornic ca sarea*[21] in Romanian).

Semantic and syntactic equivalence is obvious for the two sets of examples above, much like in the pair *to get on like salt and iron – a-i fi drag ca sarea-n ochi,*[22] both built on analogous verbal locutions with *like/ ca* and describing the dislike somebody feels for another person. Another pair that exhibits syntactic equivalence combines the verb *to send/a trimite* and a prepositional phrase in which the head *to/la* is followed by a complement realized by a NP which contains the noun *salt/sare*: *send someone to the salt mine* and *a trimite pe cineva la sare,*[23] both meaning 'to impose forced labour on a prisoner in a salt mine'. However, the Romanian idiom preserves its literal meaning, because sending prisoners to salt mines was still a form a punishment at the beginning of the 20th century, while in English it has developed the figurative humorous sense of 'giving someone a difficult/boring work assignment' and the alternative *back to the salt mines*- (back to an activity you do not want to do).

Idiomatic comparative constructions and/or clauses use *than* or *better* in English and *ca/decât- mai bine* in Romanian. As Mac Coinnigh (2015) notes, 'the form *Better X than Y* is one of the most widely dispersed' in proverbs all over the world (p. 117) and it is built-in in the Romanian complex-compound sentence *Decât mămăligă cu unt **si** să mă uit în pământ, mai bine pâine cu sare **si** să mă uit la soare* whose English semantic equivalent *Dry bread is better with love than a fat capon with fear* is a complex sentence that does not include *salt*. The literature has identified several proverbial markers[24] which work as 'warning signs that indicate that a particular sentence is deviant from the surrounding discourse, in that it exhibits stylistic and structural adornments that are not typically found in naturally-occuring language' (Mac Coinnigh, 2015, p. 112) and which include a 'range

[14] *To eat bread and salt with someone* means 'to live in the same household with someone as partners/spouses'. The idiom was attested in the 17th century in Nicolae Costin's chronicles and appears in several Romanian folk tales.

[15] To sprinkle salt on the wound.

[16] The prepositional genitive corresponds to a genitive noun phrase in Romanian in the first idiom. For the other two idioms, the preposition *de* followed by a noun that identifies material is the head of a prepositional phrase that expresses the same meaning as the English PpP *of* + noun identifying material.

[17] The concept of the *paremiological minimum* introduced by Grigorii L'vovich Permjakov in 'On the question of a Russian paremiological minimum', in *De Proverbio* - Issue 5:1997 & Issue 6:1997 highlights the existence of a core set of 'proverbs, proverbial expressions, popular literary quotations and other forms of clichés' that adult members of a society recognize and/or use.

[18] As salt as mackerel.

[19] Salty like a salt mine.

[20] As dear as salt in food.

[21] As abundant/economical as salt.

[22] To like someone like salt in the eyes.

[23] To send a prisoner to the salt mine.

[24] 'The phonological, semantic, and syntactic devices that occur frequently in proverbs across languages' (Mac Coinnigh, 2015, p. 112).

of devices which operate in ensemble to effect the concept of proverbial style, amongst which the most important are parallelism, ellipsis, alliteration, rhyme, metaphor, personification, paradox, and hyperbole (Mieder, 2004: 7 in Mac Coinnigh, 2015, p. 112). Of these markers, parallelism and metaphor are found in the English proverb above, while the Romanian expression additionally includes ellipsis, alliteration and rhyme.

The so-called 'great areas of sameness' between two proverb corpora the researcher detects when studying proverbs in two or more cultures mostly concern 'the syntactic structures of the individual proverb sentences, their logical patterns, the themes they address, and especially the messages, lessons, or kind of advice they put across' (Petrova, 2015, p. 243). Consequently, my attempt at matching the English and Romanian proverbs containing the words *salt/sare* or one of their derivatives included these areas in the processes of selection and analysis, which led to the creation of three categories: proverbs with equivalent meaning and equivalent syntactic structure, but with no salt-related word either in English or in Romanian; proverbs with equivalent meaning and equivalent syntactic structure containing salt-related words in English and in Romanian; proverbs with equivalent meaning but different syntactic structure containing salt-related words in English and in Romanian. In the discussion of the selected illustrations of the categories above, I also found it useful to resort to Mac Coinnigh's classification of sentence functions therefore identified as 'declarative (or indicative); interrogative; imperative; and exclamatory, which can be drawn together into two larger main groups: Affirmative and Communicative. Proverbs exhibit all these different functions, although some may be more frequently used than others (2015, p. 115).

One instance that illustrates the first group is the Romanian *Dușmanului să-i dai pâine și sare*[25] with the variant *Dușmanul cel mai rău cu pâine ți-l câștigi,*[26] an imperative sentence that communicates instructions/ advice and whose meaning is equivalent to the English *Make your enemy your friend* that uses the same imperative pattern. Like in most proverbs with an imperative sentence structure, metaphor is the only device used in Romanian, as well as in English. In the same way, only the Romanian proverb *Glumele să-ți fie ca sarea în bucate*[27] contains the noun *salt*, unlike its English semantic correspondent *Leave a jest when it pleases you best*, with the variants *Leave a jest when it pleases lest it turn to earnest* and *Long jesting was never good.* However, besides including the same type of metaphor, the English proverb – but not its two variants - additionally uses rhyme. A pair of semantically analogous proverbs with an exclamatory communicative sentence structure *Salt water and absence wash away love* and *Ochii care nu se văd se uită*[28] provides yet another example in this category, but this time the Romanian proverb does not contain the noun *sare*, while the English one starts with *salt.*

The following two pairs are representative of the group of proverbs with equivalent meaning and equivalent syntactic structure containing salt-related words in English and in Romanian. The first set is made of negative imperative sentence structures in both languages and communicates a piece of advice: *Give neither counsel nor salt till you are asked for it* (with the variant *Do not offer salt or brains*) in English and *Sare, pânã nu cere, sã nu-i dai cuiva*[29] in Romanian). The two English variants include, besides *salt, counsel* and *brains* among the things that people should not volunteer to offer, which makes the two English version more complex and metaphorical. The semantically analogous proverbs *Salt seasons all things* and *Sarea-i bună în fiertură, însă nu peste măsură*[30] are exclamatory communicative sentence structures, with the Romanian proverbs offering extra information this time, which in turn makes it more elaborate.

One last pair illustrates the category of proverbs with equivalent meaning but different syntactic structures. Thus, *Before you make a friend, eat a bushel of salt with him* is an imperative sentence structure, while its Romanian correspondent *Trebuie să mănânci un car cu sare cu cineva ca să-l poți cunoaşte bine* [31] is an exclamatory communicative sentence. Semantically though the two proverbs are very similar, both highlighting the large amount of salt - *bushel/car* - two persons need to eat together in order to get to know each other.

Conclusions

Much like in the case of the superstitions about salt, the idioms and proverbs in which salt is the common denominator have not only survived to the present day in English and Romanian, but by their presence in literature and pop culture they have become part of the paremiological minimum of the two national cultures. Specialized collections like *Proverbs, A handbook*, W. Mieder, (2004), *Dictionary of English phrases*, R. Allen (2008), *Dicționar de citate românești*, M. Barbu, (1923), *Dicționar de expresii și locuțiuni românești*, V. Breban, & A. Canarache, (1969), *Lexic românesc: cuvinte, metafore, expresii*, S. Dumistrăcel, (1980), *Dicționar de expresii idiomatice românești*, A. M. Dobrescu, (2008) and many others include expressions of popular wisdom with or without their literary sources. Additionally, they

[25] Give your enemy bread and salt.
[26] You'll win your worst enemy over with bread and salt.
[27] Your jokes should be like salt in food.
[28] Similar to *Out of sight, out of mind.*
[29] Do not give salt to anyone before they ask for it.
[30] Salt seasons the broth, but not in excess.
[31] To get to know somebody, one needs to eat a cartload of salt with him/her.

contain locutions originating from influential books such as the Bible that were translated and circulated in several languages. The reservoir of such idiomatic phrases is constantly updated in online dictionaries like the *English Oxford Living Dictionaries* (https://en.oxforddictionaries.com), the *Urban dictionary* (www.urbandictionary.com), *Dicționarul explicativ al limbii române* (https://dexonline.ro), the *123urban.ro* (www.123urban.ro), etc.

A comparative and/or contrastive analysis of idioms and proverbial sayings that approaches them as semantic units is facilitated, on the one hand, by acknowledging the relations (i.e. synonymy, equivalence, variation, analogy, etc.) they show between them, either inside the same language or between two different languages. On the other hand, a look at the morphosyntax of matching proverbs from different languages will highlight a set of fixed structures that can be recognized across languages and cultures as incontrovertible linguisitc manifestations of human universals.

References

Flonta, T. 1992. *Dictionar Englez-Român de proverbe echivalente = English-Romanian dictionary of equivalent proverbs .* Bucharest: Teopa srl.

Lockard, C. A. 2011. *WORLD: Volume I.* Wadsworth Cengage Learning.

Mac Coinnigh, M. 2015. Structural Aspects of Proverbs. In H. Hrisztova-Gotthardt, and M. Aleksa Varga, *Introduction to Paremiology: A Comprehensive Guide to Proverb Studies*: 112-132. Berlin: de Gruyter.

Petrova, R. 2015. Contrastive Study of Proverbs. In H. Hrisztova-Gotthardt, and M. Aleksa Varga, *Structural Aspects of Proverbs*: 243-261. Berlin: de Gruyter.

SIL-International 2017. *idiom*. Retrieved October 22, 2017, from Glossary of linguistic terms: http://www.glossary.sil.org/term/idiom

Wade, J. 1825. *Select proverbs of all nations: illustrated with notes and comments, to which is added, a summary of ancient pastimes, holidays and customs. With an analysis of the wisdom of the ancients, and of the fathers of the church, the whole arranged on a new plan.* New York, P. Covert.

Morphonyms Related to '*Slatină*' and '*Slătioară*' in Eastern Romania

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Abstract

The author proposes to study the salt-related morphonyms in the Romanian area between the Carpathians and the Prut River, with particular focus on the toponymy influenced by the presence of salt springs (Rmn. slatină). Following a quasi-exhaustive inventorying of salt-related toponyms mentioned in various categories of sources (documents, geographic and toponymic dictionaries, specialized works, and maps dating to different periods), the morphonyms 'slatină' and 'slătioară' were analysed from the perspective of the original theory of toponymic fields, elaborated by the Romanian scholar Dragoș Moldovanu ('A. Philippide' Institute of Romanian Philology in Iași). The main conclusion is that salt sources generate complex toponymic fields (by polarization, by differentiation, and by both).

Keywords: Toponymy, salt spring, brine, morphonyms, Eastern Romania.

It is well known that the study of the only natural mineral that is indispensable to human and animal life has witnessed an extraordinary progress during the last half century in the international scientific arena. Romanian specialists from the most diverse fields of research have acknowledged the importance of salt in the evolution and development of human societies across time, starting even in prehistory, and have tackled the topic in an uni- or inter-disciplinary manner, to the point of establishing an all-encompassing discipline, the Anthropology of Salt (cf. Alexianu 2012).

Even though salt has influenced mankind in all areas of life, the scientific world has primarily featured works from the field of archaeology, highlighting in particular the exploitation techniques and the uses of the finished product during prehistoric times, as well as issues related to the geology, ethnography, history, or the symbolism of this element. Those involved in the research of salt from an anthropological perspective have likewise acknowledged its influence on human communities, as reflected, among others, by toponymic practices.

Nevertheless, there are relatively few works on these topics (Alexianu 2011, 2012a, 2015; Asăndulesei 2015; Bounegru 2012; Poruciuc 2011; Curcă 2007, 2008). Interestingly, this situation occurs even though toponymic research is a complex science involving vast knowledge from multiple domains, such as philology, geography or history (Ungureanu, Boamfă 2006: 11), investigating the placenames from several perspectives: origin, meaning, form, evolution, writing, transliteration, pronunciation, or translation (Nicolae, Suditu 2008: 13).

In the Romanian scientific landscape, toponymic research peaked with the advancement by D. Moldovanu of an original theory (*The theory of toponymic fields*, Iasi, 2010), applied relatively recently for the first time in the case of the toponymy generated by the salt springs (Alexianu 2012a; Asăndulesei 2015).

Briefly, the theory of toponymic fields involves the classification of placenames according to their form or content, developed around a base toponym serving as a polarizing centre, in the series of polarised toponyms (Moldovanu 2010: 229). A toponymic field is a structure through which the association of geographical elements for denomination, from a certain area, are reflected through analytic or synthetic oppositions (Moldovanu 2010: 25), revealed by polarisation or differentiation. The process of toponymic polarisation relies on the creation of toponymic derivatives from a core-toponym, which corresponds with the most important object from a unitary geographical reality (Moldovanu 2010: 18). The second type of toponymic field is generated by toponymic differentiation, a process through which parts of some denominated geographical objects are designated (Moldovanu 2010: 19). It seems that geographical reality has demonstrated that the two fields can be applied simultaneously to denominated elements, producing the so-called mixed toponymic field. The latter can be interpreted in two manners: either through the existence of placenames formed both through polarisation and differentiation or through the existence of a toponym that designate a complex geographical reality (e.g. *Coasta Poienile Sării*, etc.).

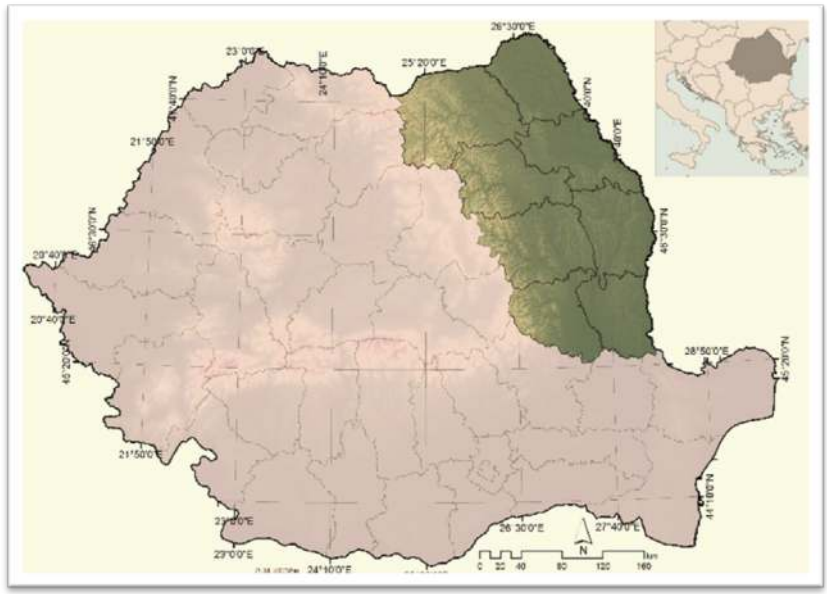

Figure 1. Map of Romania with the study area — the tract of land between the Eastern Carpathians and the Prut — delimited (made by A. Asăndulesei).

Table 1. Halo-morphonyms derived from salt springs, called slatină.

Morphonym	County	Geographical description	Map no. (Figure 4)
Dealul Slatinei	Bacău	In the southern part of the Mănăstirea Cașin commune, on the border with the Soveja commune (T.m.).	1
		Located in the southeastern part of Răchitișu village, Strugari commune (T.m.).	2
		South of the village Luncani, Mărgineni commune (T.m.).	3
	Neamț	Hill north of the village Bistrița, Alexandru cel Bun commune (T.m.).	4
		West of the village Hoisești, Mărgineni commune (T.m.).	5
	Suceava	In the southewestern part of the village Vicovu de Jos, Vicovu de Jos commune (T.m.).	6
		In the northwestern part of Sadova village, Sadova commune (T.m.).	7
		Hill south of Râșca, 502 m max. elevation, Râșca commune (T.m.).	8
		Hill south of Râșca, 592 m max. elevation, Râșca commune (T.m.).	9
Valea Slatinei	Bacău	Located east of the village Albele, Bârsănești commune (T.m.).	10
		South of the village Luncani, Mărgineni commune (T.m.).	11
		Southeast of the village Solonț, Solonț commune (T.m.).	12
	Neamț	South of the village Oglinzi, Răucești commune (T.m.).	13
Vârful Slatinei	Bacău	Hilltop with a max. elevation of 1484 m, located in the eastern part of the village Răchitiș, Ghimeș-Făget commune (T.m.).	14
Piciorul Slatinei	Neamț	Identified east of the village Răchitiș, Tarcău commune (T.m.).	15
Măgura Slatinii	Suceava	Hill in the territory of the settlement Stulpicani (T.m.).	16
Obcina Slatinei		Elevated point in the western part of the village Demăcușa, Moldovița commune (T.m.).	17
Dealu Slatina		Hill on the border between the villages Doroteia, Frasin and Stulpicani (Diacon 1989, 255).	18
Între Măgura Slatina		Hill in the territory of the village Stulpicani, Stulpicani commune (Grămadă *apud* Diacon 1989, 255).	19

The originator of this novel theory has likewise expounded upon the organisation of toponyms according to the domains of the reality to which they apply, sorted according to geographical criteria: names of human settlements, waterbodies, mountains, forests, etc. from the perspective of the designation relationship (Moldovanu 2010: 9). Pursuing this direction, the present paper focuses on the morphonyms encountered in the area between the Eastern Carpathians and the Prut River (Figure 1) — denominations that designate the totality of landforms, positive or negative (Nicolae, Suditu, 2008: 97) — formed on the basis of the element *slatină*, which has generated the richest toponymic field (Alexianu 2012a: 21).

Recently, a number of models have been generated on the basis of this theory (Alexianu 2015), representing a potential toponymic field associated with several denominations related to the saline element. These examples do not exist for each geographical sequence, but constitute a collection of all attestations of halo-toponyms — place-names reffering to salt — identified in the studied works.

In order to identify the morphonyms derived from salt springs, a vast body of work has been consulted, comprising collections of medieval documents, geographical dictionaries from the late 19th and early 20th century, toponymic dictionaries with historical names in use at the end of the 20th century, scientific works referring tangentially to halo-toponyms, and, obviously, maps from various periods.

In order to have an overall picture of all halo-morphonyms from the Carpathians to the Prut, determined by the denomination of the salt springs, viz. *slatină*, 28 points are presented here in table form (Tables 1 and 2).

For a start, it must be made clear that the lexem *slatină* can indicate a saline (mineral) water spring (Porucic 1931: 78), a saline water (Porucic 1931: 39), a marshy and saline land (Porucic 1931: 63), or overly salty food (DEX 2009: 1025). From the etymological point of view, the term comes from the Slavonic слатина for the first three meanings (Curcă 2007: 779), while the last is used with a metaphoric meaning. The other lexical unit with which the present paper is concerned derives from the previous, through a construction with the diminutival suffix *–oară*. In general, on the linguistic level, the diminutival presentation, formed through differentiation, is particularly due to the small size of the denominated geographical object or, as in our case, the lower concentration of salt in the salt springs. Another explanation could be the stressing of a certain attachment of the communities that won their paternity with respect to the denominated element, also valid in the case of our diminutive, *slătioară*. The confirmation of this hypothesis is expressed through the legend about selecting the name of the village of Slătioara (Râșca commune, Suceava County), which speaks about the moderate qualities of the salt springs from around the area: 'springs of salt water, but not so salty that sheep cannot drink it, on the contrary [...] it is good for them [...] The shepherds named the place, as in a caressing' (Diacon 1989: 249). In reality, the situation is much more complex: the diminutive of the appellative *slatină* constituted the base for the hydronym Slătioara, from which the oikonym of the same form polarised (Diacon 1989: 251).

Table 2. Halo-morphonyms derived from the determinative slătioară.

Morphonym	**County**	**Geographical description**	**Map no. (Figure 4)**
Valea Slătioara	Neamț	Located west of the village Făurei, Făurei commune, in the vicinity of the Dealul Slatinei (T.m.).	20
Dealul Slătioara	Suceava	Hill in the northwestern part of the village Slătioara, Stulpicani commune (T.m.).	21
		Located in the eastern part of the village Slătioara and south of the village Poiana Mărului, Mălini commune (T.m.).	22
Muchia Slătioara		East of the village Slătioara, Râșca commune.	23
V. Slătioara		Found in the territory of the the village Slătioara, Stulpicani commune (T.m.).	24
Valea Slătioarei		Valley in the territory of the settlement Slătioara, Stulpicani commune (Diacon 1989, 257).	25
Vârful Slătioarei		South of the village Voroneț, Gura Humorului commune, 853 m max. elevation (T.m.).	26
Piciorul Slătioarei		In the southern part of the village Voroneț, Gura Humorului commune (T.m.).	27
Vârful Piciorul Slătioarei		In the southern part of the village Voroneț, Gura Humorului commune, 916 m max. elevation (T.m.).	28

Analysing this situation, but also the reality in the field, in which the salt springs are denominated only through the qualificative/name *slatină*, it follows that the diminutive *slătioară*, from which a portion of the morphonyms from the analysed area derives, denominates creeks (Diacon 1989: 251), probably originating, at one point in time, from salt springs or located near them. Similarly, inquiries showed that the denizens from near the salt springs state 'walk along the creek, and you'll reach the *slatina*' when asked to provide orientation indications for them; notable is the denomination, somewhat confusing, of watercourses with the term *izvor* (water source/spring).

Therefore, by attempting an analysis of the evolution of the halo-toponyms derived from *slătioară*, it can be stated that the landforms whose denominations also contain this appellative have polarised, probably, in a more distant past, from a (less) salty water spring, a hypothesis also supported at the lexical level, considering the fact that *slătioară* derives from *slatină*. Furthermore, it is not excluded that *Slătioara* entrenched itself, quickly replacing the primary meaning, as denomination of running waters, perhaps slightly saline (brackish), becoming a core-toponym.

The analysed morphonyms are divided into two categories, one having as main element *slatină* and one in which the toponyms are formed from the diminutive *slătioară*, specifically the hydronym *Slătioara*.

The analytical manner in which the halo-morphonyms derived from *slatină* are represented is illustrated in the following lines.

The lexemes *deal*, *vale*, *măgură*, and *obcină*, followed by the determinative *slatină*, in the genitive case, highlights a relationship of belonging to the designated element through the determinative, caused by the physical proximity between the two geographical objects, determining a toponymic field through polarisation. Even though the appellatives *vârf* and *picior*, followed by the same determinative *slatină* in the genitive case, indicate opposing sections of one positive landform — elevation and base — they form a toponymic field likewise constituted through polarisation, since no opposing properties of the denominated object are accentuated.

Concerning the toponymic construction *Dealu Slatina*, the simple articulated appellative *deal* is followed by a proper noun in the nominative case. It is likely that the location of the hill on the border between the settlements of Doroteia, Frasin and Stulpicani (Diacon 1989: 255), in an area rich in saline springs, exploited since the Paleolithic (Andronic 2009: 214), has generated the name through the articulation of the determinative and the impossibility to individualise a certain salt spring. Another possibility for naming such a place could have been *Dealul Slatinelor*, but considering that the toponym was identified only on the cartographic support, it is not excluded that at one moment in time or in the memory of some inhabitants from near this place, this name was also used.

A particular situation is revealed by the toponymic syntagma *Între Măgura Slatina*. The construction of this denomination is unusual because the preposition *între* demands an appellative in the plural, or two appellatives that expose a geographical reality that can be divided, justifying the use of this preposition. In this case, there are two terms in the singular, the latter having the value of a proper name. A possible explanation could be the change, in time, of the present form of the toponym from other ones, *Între Măgura și Slatina, În Măgura Slatinei* or *În Măgua Slatina*, even though this is difficult to support from the linguistic point of view.

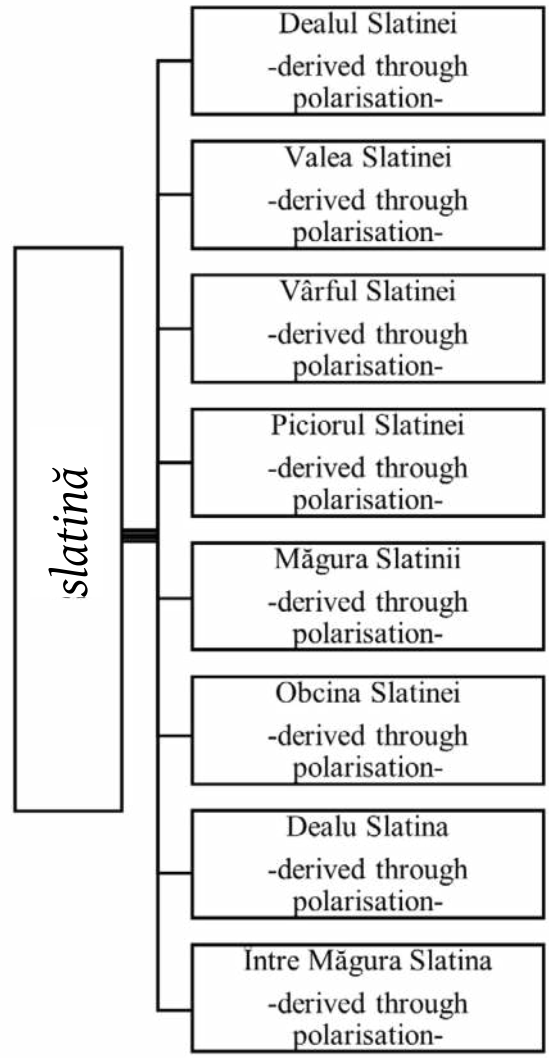

Figure 2. The potential morphonymic field generated by the regional denomination of a salt spring, slatină.

On the basis of the listed examples, it was possible to create the potential morphonymic field generated by the regional denomination of a salt spring *slatină*, for eastern Romania (Figure 2).

The halo-toponym *Slătioara* is sufficiently detailed above, with the conclusion that it derived through differentiation, denominating in most cases a running water (Diacon 1989: 251), from which oikonyms and morphonyms polarised.

In the case of the toponymic constructions, too, approximately the same appellatives have been identified from the core-hydronym *Slătioara*.

The term *valea* is followed by the determinative *Slătioara* both in the nominative, having the role of a proper name, and in the genitive. The latter variant is also mentioned, in Suceava County, in a shortened version in which the landform is recorded only with the initial *V.*, the halo-toponym probably expressing the valley described by the *Slătioara* creek.

Furthermore, there is also *Dealul Slătioara*, a toponym formed from the appellative *deal* and the determinative expressed through the proper noun *Slătioara*. The emergence of this morphonym can be analysed in multiple ways, but none can be definitely confirmed. Firstly, following the reasoning from the above, it can be stated that the halo-morphonym has polarised from the hydronym *Slătioara*. It can also be argued that there was a 'chain' polarisation, with the name of the hill probably playing in its turn the role of core-toponym, from which the oikonym *Slătioara* polarised. At the same time, it is possible that polarisation also occurred the other way around, with the morphonyms polarised from the oikonym *Slătioara*, given that it is located on the territory of the village thus named, and the latter polarised from the hydronym of the same form. It is difficult to select one of the two, even though logically, the second variant is more plausible, since the inhabitants of the village denominated the geographical elements from their vicinity, even though the hill existed before the settlement.

Even though the halo-toponym *Muchia Slătioara* expresses the size, shape and elevation of the denominated geographical element, it is part of the toponymic field of the hydronym *Slătioara*, likewise through polarisation, since it indicates another positive landform and does not refer to the qualities of the determinant object.

The same situation is also encountered in the case of the halo-morphonym *Vârful Slătioarei*, which is formed by an appellative and determinant, this time in the genitive, indicating a certain relation of dependence. It derived through polarisation, as did the topical name *Piciorul Slătioarei*. The two compose a denomination that reveals a complex geographical reality, *Vârful Piciorul Slatinei*, determined by the elevation of the mountain.

Given this analysis of the morphonyms polarised from the hydronym *Slătioara*, the following potential toponymic field has been created, for the entire area between the Carpathians and the Prut (Figure 3).

The halo-toponyms derived from the denomination of Slavic origin *slatină* are only a part of the multitude of topical names engendered by various saline manifestations. The existence of numerous salt springs in eastern Romania has influence the toponymy of the area (Poruciuc 2011: 215), constituting the most important entity to which other geographical elements relate, thus revealing the elementary human

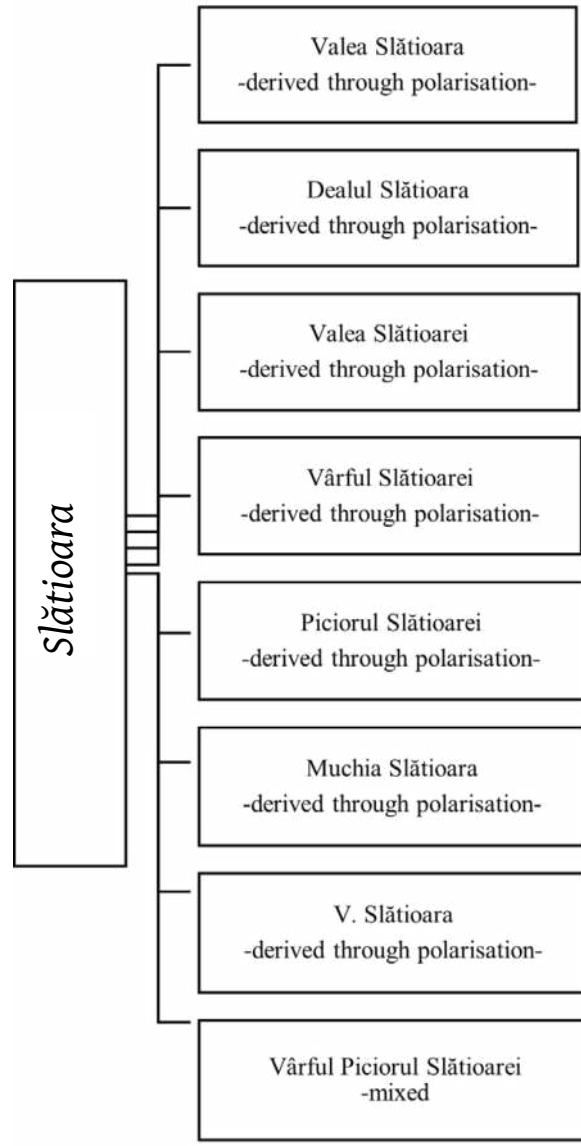

Figure 3. The potential morphonymic field derived from the hydronym Slătioara.

mechanism for spatial orientation (Alexianu 2012a: 21). Thus, we can see that the halo-toponyms created from the element *slatină* concentrate in the Carpathian piedmont area, where the salt springs denominated as such are found (Figure 4).

The analysis of all morphonyms derived from *slatină* found in the Eastern Carpathian area of Romania has shown a predominance of genitival toponymic syntagmas, which highlights the importance of the salt springs from this region and the relation of dependency of the denominated geographical objects, proving its role of core for numerous halo-toponyms of the region and the country. The importance of toponymic studies consists of such examples of emphasis on a certain geographical element in human communities,

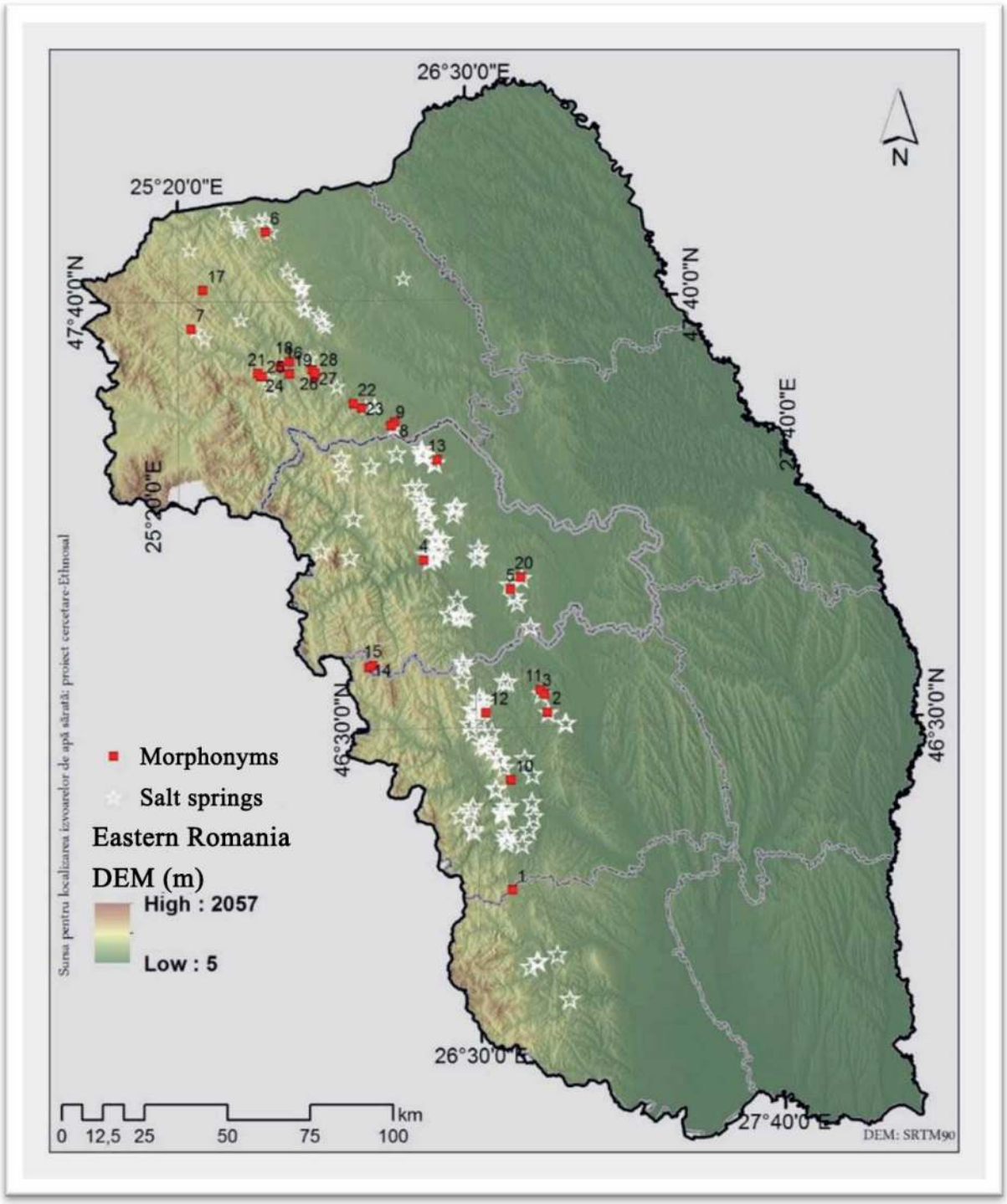

Figure 4. The hypsometric map of the area between the Carpathians and the Prut, with the salt springs and identified halo-morphonyms (made by A. Asăndulesei).

in our case the salt springs, by influencing their denominations and the evolution from simple appellatives, to spontaneous and eventually official toponyms. Alongside this aspect, the analysis of the toponyms underlines the contact between local and various foreign populations at a certain point in time, revealing interesting constructions between terms of different origin, leading to the confirmation of historical contexts.

Acknowledgements

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References

Alexianu, M. 2011. Sarea: reflexe onomastice în limba română. In O., Felecan (ed.), *Numele și numirea. Actele conferinței internaționale de onomastică, Ediția I: Interferențe multietnice în antroponimie, Baia Mare, 19-21 septembrie 2011:* 579-583. Cluj-Napoca, Editura Mega.

Alexianu, M. 2012. Anthropology of Salt: A First Conceptual Approach. In M. Alexianu, R.-G. Curcă and V. Cotiugă (eds.), *Second Arheoinvest Symposium. From the ethno-archaeology to the anthropology of salt. April 20th–21st, 2012, Iaşi, Romania. Programme and Abstracts*: 9-10. Iași, Editura Universității 'Alexandru Ioan Cuza' din Iași.

Alexianu, M. 2012a. Salt Springs in Romanian Toponymy. In M. Alexianu, R.-G. Curcă and V. Cotiugă (eds.), *Second Arheoinvest Symposium. From the ethno-archaeology to the anthropology of salt. April 20th–21st, 2012, Iaşi, Romania. Programme and Abstracts*: 21. Iași, Editura Universității 'Alexandru Ioan Cuza' din Iași.

Alexianu, M. 2015. The Potential Toponymic Field of Salt Springs in Romanian Microtoponymy. In In M. Alexianu, R.-G. Curcă and V. Cotiugă (eds.), *Salt Effect. Second Arheoinvest Symposium: From the ethnoarchaeology to the anthropology of salt 20-21 April 2012, 'Al. I. Cuza' University, Iaşi, Romania*: 261-264. Oxford, Archaeopress, British Archaeological Reports, International Series 2760, Archaeopress.

Andronic, M. 2009. Prezențe ale omului preistoric în Carpații Bucovinei, in *Arheologia Moldovei* XXXII: 209–219.

Asăndulesei, M. 2015. The Toponymy of Salt in Geographical Dictionary of Bessarabia by Zamfir Arbore. In M. Alexianu, R.-G. Curcă and V. Cotiugă., *Salt Effect. Second Arheoinvest Symposium: From the ethnoarchaeology to the anthropology of salt 20-21 April 2012, 'Al. I. Cuza' University, Iaşi, Romania:* 265-273. Oxford, Archaeopress, British Archaeological Reports, International Series 2760.

Bounegru, A. 2012. Halotoponyms and Halohydronyms as Reflected in Medieval Documents from Wallachia. In M. Alexianu, R.-G. Curcă, V. Cotiugă (eds.), *Second Arheoinvest Symposium. From the ethno-archaeology to the anthropology of salt. April 20th–21st, 2012, Iaşi, Romania. Programme and Abstracts:* 23. Iași, Editura Universității 'Alexandru Ioan Cuza' din Iași.

Bounegru, A. 2012. Halotoponyms and Halohydronyms as Reflected in the Atlas 'Plans des Bukowiner Districts in 72 Sections Welche in Denenjahren 1773, 1774 Und 1775 von Einen Departament des Kays: Königlicher General Staabs Geometrisch Aufgenommen Worden'. In M. Alexianu, R.-G. Curcă, V. Cotiugă (eds.), *Second Arheoinvest Symposium. From the ethno-archaeology to the anthropology of salt. April 20th–21st, 2012, Iaşi, Romania. Programme and Abstracts:* 24. Iași, Editura Universității 'Alexandru Ioan Cuza' din Iași.

Curcă, R.-G. 2007. Halotoponymes et halohydronymes dans les documents medievaux de la Moldavie (XIVe-XVIIeS.). In Morère Molinere Nuria (ed.), *Las Salinas y la sal de interior en la historia: economía, medio ambiente y sociedad. Inland salt works and salt history: economy, environment and society*, Tomo II: 777-784. Madrid, Dykinson.

Curcă, R.-G. 2008. Halotoponime și halohidronime în documentele medievale din Moldova (sec. XIV-XVII). In Gh. Dumitroaia, D. Monah (eds.), *Sarea de la prezent la trecut*: 107-115. Piatra-Neamț, Bibliotheca Memoriae Antiquitatis, XX, Editura 'Constantin Mătasă'.

Diacon, V. 1989. *Vechi așezări pe Suha Bucovineană. Pagini monografice*, Iași.

Moldovanu, D. 2010. *Teoria câmpurilor toponimice (cu aplicație la câmpul hidronimului Moldova)*. Iași, Editura Universității 'Alexandru Ioan Cuza'.

Nicolae, I., Suditu, B. 2008. *Toponimie românească și internațională*. București, Editura Meronia.

Porucic, T. 1931. *Lexiconul termenilor entopici din limba Română în Basarabia*. In Arhiv. Bas. An. II, nr. 1, 2, 3, 4 și An. III nr. 2. Chișinău, Tipografia Eparhială Cartea Românească.

Poruciuc, A. 2011. Etymological and Historical Implications of Romanian Place-Names Referring to Salt. In M. Alexianu, O. Weller and R.-G. Curcă (eds.), *Archaeology and Anthropology of Salt: a Diachronic Approach. Proceedings of the International Colloquium, 1-5 October 2008 'Al. I. Cuza' University (Iaşi, Romania)*: 215-218. Oxford, Archaeopress British Archaeological Reports International Series 2198.

Ungureanu, A. and Boamfă I. 2006. *Toponomastică*. Iași, Sedcom Libris.

Topographic map (T.m.): *Harta topografică militară*, scara 1:25000, 1984-1985, by Direcția Topografie Militară.

The Biography of the Romanian Expression *a făgădui marea cu sarea* (Romania)

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Abstract

This article presents the biography of the expression *a făgădui marea cu sarea* (to promise the sea with the salt) 'to promise something impossible to achieve' and provides a solution regarding its origin, in the light of the polemics which were born during nearly a century in Romanian linguistics. The linguistic history of this expression is, on the one hand, proof of the value that phraseology has for the study of the relationship between the language and culture and, on the other hand, confirmation of the importance that an element of material culture such as salt has for the collective imagination.

Keywords: salt, expression, Romanian, language, culture.

Sextil Puşcariu published, in 1922, in the journal 'Cugetul românesc', I, an article that would become famous in Romanian linguistics, *Expresia 'a făgădui marea cu sarea'*. The article was republished in a French version, in the volume *Etudes de linguistique roumaine* (1937: 121-124), and the material was further exploited in two capital works of Puşcariu, *Studii istroromâne*, vol. II, (1926: 365-366) and *Limba română I Privire generală*, (1940: 253-254). This article caused a whole series of debates in the literature, and the discussion on the origin of the expression in the title is still open.[1]

I here briefly include the content of the article published in 1922 in the journal 'Cugetul românesc' using the French translation published in 1937 in *Etudes de linguistique roumaine*: 121-124.

Sextil Puşcariu assumed that there are expressions in all languages that mark an exaggerated, impossible promise. Salustius said about Catilina that, impoverished, *maria montesque polliceri coepit* (he started promising seas and mountains). The same phrase may also be found in Italian – *promettere mare e monti*, Portuguese – *prometter mares et montes* etc. In Latin there was a more familiar expression, *montes auri polliceri* (to promise mountains of gold), which also occurs in other languages, French – *promettre des montagnes d'or*, Spanish – *prometer montes de oro*, German – *goldne Berge versprechen*, Russian – *sulitĭ zolotyja gory*. We find the same hyperbolic image at the basis of such expressions as the German *das Blaue vom Himmel versprechen* (to promise the blue of the sky) or the Hungarian *eget földet igér* (he promises heaven and earth). Therefore, Puşcariu attempts to reconstruct the phraseological field of the meaning 'to promise something impossible to achieve' in known languages. He also seizes a very important stylistic aspect, namely that these phrases are often fixed in memory by rhyme, for instance, the Italian *promettere Roma e toma* or the Portuguese *prometter mundos e fundos*, or alliteration, for example the French *promettre monts et merveilles*.

Puşcariu notes, however, that in the Romanian language, the common expression is *a făgădui marea cu sarea* (to promise the sea with the salt) or *marea* şi *sarea* (the sea and the salt), sometimes completed with şi *Oltul cu totul* (and the Olt River altogether) or *făgăduieşte marea cu sarea şi-i dă ce nu curge pe apă* (he promises the sea with the salt and gives what does not flow on the water).[2] Regarding this expression, Sextil Puşcariu argues that it is familiar to all Romanians north of the Danube, but does not occur among the Romanians in the Balkan Peninsula or among any other peoples. Therefore, this is an expression specific to the Romanian people, remarkable in several respects.

S. Puşcariu clarifies the semantic directions of the expressions from other languages, depicting an unachievable promise. On the one hand, the object of the promise may be a huge thing that cannot be offered (sea, mountains, sky, earth), and on the other hand, something so precious that can neither be had, nor offered, such as the gold from the mountains. The linguist from Cluj asserts that the first element of Romanian structure, *mare* 'sea', is in line with the general meaning of the expressions from other languages, but the second element, *sare* 'salt', does not correspond to

[1] The article also has a version in Romanian: Petronela Savin, *Expresia imaginară „a făgădui marea cu sarea"*. Universalitate şi specificitate culturală, 'Studii şi cercetări ştiinţifice', no. 36, 2016, p. 33-30.

[2] S. Puşcariu omits the fact that in Romanian there are also other expressions illustrating an unrealizable promise, such as *a făgădui* (or *a promite) cerul şi pământul* (to promise heaven and earth), 'to promise unachievable things', *a promite (şi) luna de pe cer* (to promise [even] the moon in the sky), 'to promise things one cannot achieve' (cf. DLRLC).

the logic of the formation of this type of structures. The reason is that salt in the Romanian space could not have been considered a precious item given the fact that the Carpathian Mountains were known for the many salt deposits.

In this context, for Puşcariu, it is obvious that this expression did not originate in the present territory of Romania, but in an area close to the sea and without salt. This region can only be the western part of the Balkan Peninsula, where salt was very rare and brought from the Dalmatian coast, where it was obtained from seawater. According to Puşcariu, only in that area was salt something so precious and sought for that promising salt was an exceptional act. The linguist links this expression with one of the basic occupations of the ancestors of the Romanians, shepherding. The salt must have been particularly precious for shepherds, who needed it for making cheese, for their daily food and for the food of animals.

The scholar from Cluj identified these Romanians with the Romanians from Serbia and Medieval Croatia (ancestors of Istro-Romanians), often mentioned in documents, as shepherds or couriers who brought their products to Dalmatian cities, especially wool and the famous 'caseum valachicum', and returned to the hinterland mainly with salt. This population was Slavicized or emigrated, only several names of people, places and some traces of the old language having been preserved in this space until today. The names of people and places documented reveal the fact that the dialect spoken by these western Romanians was similar to the Daco-Romanian dialect and not the Aromanian one, which demonstrates the close connections between the Romanians from Serbia and those from Dacia. Puşcariu also admitted to a migration of the rhotacising Romanians from the south to the north of the Danube River, a migration that allegedly also brought the expression *a făgădui marea cu sarea.*

From Puşcariu's point of view, rhyme has made the expression persist, even if for the Romanians north of the Danube the image it is based on does not make sense. Instead, the structure *a făgădui Oltul cu totul* (to promise the Olt River altogether) could have circulated on good grounds, and regarding the addition şi-i *dă ce nu curge pe apă* (and gives what does not flow on water), this may designate, according to Puşcariu, the very idea of 'salt'.[3]

The author recognizes that it would be risky to draw conclusions about the territorial occupation by the old Romanians only based on the origin of a phrase, but if the argument is examined in relation to other historical and linguistic data, such as the expression in question, the study of the origin of phraseologisms may represent an important argument.

S. Puşcariu resumes the explanation of the origin of this expression in his work, *Studii istroromâne*, vol II. (1926: 365-366), using it as an argument of the work's thesis, namely that the Istro-Romanians are 'western' Romanians who lived in the Middle Ages on the right shores of the Danube in contact with the Serbs. It should be noted that S. Puşcariu already shared the view that the Romanian people and language were formed both north and south of the Danube, the relations between the Romanians in the two areas being maintained mainly by transhumance shepherds and the carriers always on the road (salt being one of the most often transported goods).[4]

The first reaction to Puşcariu's explanation on the formation of the expression *a făgădui marea cu sarea* came from A. Philippide in his major work *Originea românilor*, vol. II. (1927: 365). Philippide refers to the expression in question in the context of the argumentation on the formation of the Romanian language and people which, according to him, arose only south of the Danube, from where it 'overflowed' to the west and south of the Balkan Peninsula, as well as north of the Danube (Philippide 1927: 404-407).[5] A. Philippide partially agrees with the historical explanation of the expression that Puşcariu (1926) gives in *Studii istroromâne*, vol. II, considering that it is not evidence for the relationships the Daco-Romanians had with the Istro-Romanians, who served as carriers for the transportation of salt from the Adriatic Sea to the hinterland, where salt was so rare and sought after, but that rather the saying *a făgădui marea cu sarea* is evidence that the Daco-Romanians once lived on the right side of the Danube and that, moreover, at the time, the relations between the territories from the right bank and those from the left bank were not as strong as Puşcariu argues. Otherwise, the inhabitants from the right shore would have purchased salt from the countries on the left shore also and not only from the Adriatic Sea (Philippide 1927: 385). So, A. Philippide also uses this expression as proof for the argument regarding the territory where the Romanian language and people were formed, but in relation to the meaning of its conception.

[3] B.P. Hasdeu in HEM, p. 112, believes that this part of the expression, *ce nu curge pe apă* (what does not flow on water) 'is an admirable euphemism for the most trivial notion'.

[4] Puşcariu (1926: 357) stated the following: 'I find it so that instead of looking for the Romanian people a cradle on a limited geographical area, it is more natural to assume that today's Romanians are the last survivors of the Roman population living in the northern half the Balkan Peninsula and the Romanized lands left of the river Danube. [...] The conquest by invaders, especially the Slavs, of these regions, resulted in a decrease and rarefying of the Romanic population. What has been preserved, as a Latin people, are us, Romanians'.

[5] A. Phillipide (1927: 274) believed that to achieve a complete unification of the Romanian nation implied by the complete unity of the Romanian language, 'there was needed the closest possible co-existence geographically and politically, and this could have happened only in the Balkan Peninsula where all the historical facts lead us.'

N. Iorga (1942: 83-88), in a review published in 'Revista istorică', XXVIII, no. 1-12, devoted to the work of S. Puşcariu, *Limba română*, vol. I, Bucureşti (1940), discusses the case of the expression *a făgădui marea cu sarea* and challenges Puşcariu's explanation, arguing that there is historical evidence that sea salt was extracted not only from the Adriatic, but also from the Black Sea (Iorga 1942: 85).

G. Ivănescu (1980), in his synthesis work *Istoria limbii române*, analysed the expression *a făgădui marea cu sarea* in the context of the semantic developments of words from the pre-literary period of the Romanian language, evolutions also explainable through the main occupation of a large part of the Romanians, shepherding. G. Ivănescu agrees with the historical explanation proposed by S. Puşcariu, arguing that the 'expression was created in Yugoslavia between the 10th and 14th centuries and, after its creation, spread rapidly to the Daco-Romanians through the rhotacising migrations, but without migrations of people' (Puşcariu 1980: 362).

Therefore, some of the most important Romanian linguists, S. Puşcariu, A. Philippide, G. Ivănescu, reputed specialists in the history of Romanian language, agreed with a historical-ethnological explanation of the expression *a făgădui marea cu sarea*, by connecting it to the Romanians from Medieval Serbia and Croatia (the ancestors of the Istro-Romanians), whereas the historian N. Iorga opposed this explanation.

Also against a historical explanation of the expression in question was the Austrian linguist Leo Spitzer, as shown in his articles *L'expression ‹ a făgădui marea cu sarea ›*, in 'Bulletin Linguistique', V (1937: 190-195) and *Sur ‹ a făgădui marea cu sarea ›* in 'Bulletin Linguistique', VI (1938: 238). Leo Spitzer argued that the phrase has a stylistic explanation, considering it exclusively the result of phonetic symmetry, a proof of this also being the version in which the structure is continued with the syntagm şi *Oltul cu totul* (and the Olt River altogether). This stylistic explanation is also supported by Iorgu Iordan (1975) who, in the work *Stilistica limbii române*, discusses the expression *a făgădui marea cu sarea* in the chapter 'Ritmul' (The rhythm), regarding the rhyme *marea–sarea* as defining for the expression's formation (Iordan 1975: 91).

Further contribution on the etymology of this phrase is made by Stelian Dumistrăcel in his dictionary *Până-n pânzele albe. Expresii româneşti* (2001: 224-225). The author notes that it is surprising that S. Puşcariu, like A. Philipide or G. Ivănescu, has not questioned the presence, in the discussed expression, of a word of Hungarian origin, (*a*) *făgădui* (Hungarian *fogadni*) 'to promise', which may contradict the assertion of creating the image of this expression at the Romanians south of the Danube, an area where Hungarian loans are insignificant (even missing when it comes to the Istro-Romanian, Aromanian and Megleno-Romanian dialects, see, moreover, Puşcariu 1976: 309).[6]

Therefore, the polemic about the origin of the expression *a făgădui marea cu sarea* covered nearly a century and is still open. Each new intervention brought extra notes on the possible path of this expression. I do not claim to end the sequence of suggested solutions, but I am privileged to be able to formulate a view based on the achievements of all previous opinions.

By discussing the expression *a făgădui marea cu sarea* (to promise the sea with the salt) 'to promise something impossible to achieve', S. Puşcariu has the great merit of having signalled a kind of methodological approach of analysis of phraseologisms. He predicted the two general directions for studying expressions today: on the one hand, cognitive linguistics, cognitive analyses, phraseologisms in terms of their capacity to illustrate the general principles of thought, reflected in metaphorical modes of conceptualization of the world in several languages (Lakoff/Johnson 1980; Liu 2002), and, on the other hand, cultural linguistic studies that recover the etymological component of phraseologisms analysing their cultural basis resulting from the particulars of their birth: historical events, material culture phenomena, specific elements of social interaction, cultural symbols, etc. (Dobrovol'skij 1998; Piirainen 2007).

Puşcariu's error, which I believe is the cause of the historical-ethnological explanation of the expression *a făgădui marea cu sarea*, is the equivalence drawn between the image of salt and that of a precious thing. I believe that salt, in this structure, is directly related to the sea (and the reference to the salt in the deposits from the Carpathians is not substantiated) and does not differ in any way from the signifying line 'huge thing – impossible to offer'. The first evidence is the continuation of the expression with the syntagm şi *Oltul cu totul* (and the Olt River altogether). Defining in this expression is the semantic value of the words *cu totul* 'altogether'. I believe that the meaning of the idea implies the understanding of the sense of totality for the entire structure: *a făgădui* [toată] *marea cu* [toată] *sarea* [ei] şi *Oltul cu totul* (to promise [all] the sea with [all its] salt and [all] the Olt River altogether). Hence, I find that the expression has an exclusively stylistic explanation and falls in a series of equivalent phraseologisms from other languages. I agree with the opinion of S. Puşcariu that rhyme is what made

[6] The lack of Hungarian loans in the Istro-Romanian dialect is discussed by S. Puşcariu also in *Studii istroromâne*, vol. II, 1926, p. 366: 'It is certain, however, that a linguistic influence from north to south had never existed before the moment when the Daco-Romanian dialect began to be influenced by the Hungarian language, for no word of Hungarian origin, not even those scattered throughout the Daco-Romanian territory (such as *bănui* 'to suspect', *chip* 'face', *mistui* 'to digest; to burn', *tămădui* 'to heal', *mântui* 'to redeem', *oraş* 'cit' etc.), or those entered in the Balkan Slavic languages, are not found among Western Romanians.'

the expression long-lasting and, like Leo Spitzer and I. Iordan, I believe that phonetic symmetry was essential in the formation of the expression, but affirm the belief that the expression is constituted based on a completely grounded semantic principle, that of hyperbolization. Of great importance in supporting this hypothesis is Stelian Dumistrăcel's pertinent observation that the verb: *a făgădui* 'to promise' is of Hungarian origin, which excludes the formation of the expression in this form before the arrival of Hungarians in Transylvania, and that the verb may vary, the possible versions being *a cere* or *a căuta marea cu sarea* (to ask for, or to search for the sea with the salt). Therefore, the fixed element of this structure is only *marea cu sarea* (the sea with the salt). In addition, Iuliu Zanne records, in his collection *Proverbele românilor*, vol. 1, p. 211, also the expression without a verb, *marea cu sarea* (the sea with the salt), about which he says that 'it means a lot of people, a lot of women, a large gathering'. The presence of this structure with the general meaning of 'great crowd' strengthens the hypothesis that we are dealing with an imaginary expression[7] conceived as a figure of speech of the hyperbole type, which is fully in line with the equivalents from other languages.

Therefore, the biography of the Romanian expression *a făgădui marea cu sarea* (to promise the sea with the salt) 'to promise something impossible to achieve' is, on the one hand, proof of the value that phraseology has at the level of the study of the relationship between the language and culture, and on the other hand a proof of the importance of an element of material culture like salt in the collective imagination.

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References

Dobrovol'skij, D. 1998. On cultural component in the semantic structure of idioms. In Ďurčo, P. (ed.), *Europhras 97: International Symposium. September 2-5, 1997, Liptovský Jan. Phraseology and Paremiology*: 55-61. Bratislava, Akadémia PZ.

Dobrovol'skij, D. and Piirainen E. 2005. *Figurative Language: Cross-cultural and Cross-linguistic Perspective*. Amsterdam, Elsevier.

Dumistrăcel, S. 2001. *Până-n pânzele albe. Expresii românești*. Iași, Editura Institutul European.

Iordan, I. 1975. *Stilistica limbii române*. București, Editura Ştiinţifică.

Iorga, N. 1940. Limba română I. In S. Puşcariu (ed.), *Revista istorică*: XXVIII, 1-12: 83-88.

Ivănescu, G. 1980. *Istoria limbii române*. Iași, Editura Junimea.

Lakoff, G. and Johnson, M. 1980. *Metaphors we live by*. Chicago, University of Chicago Press.

Liu, D., 2002. *Metaphor, culture, and worldview. The case of American English and the Chinese language.* Lanham, Maryland.

Philippide, A. 1927. *Originea românilor* II. Iași, Tipografia 'Viața Românească'.

Piirainen, E. 2007. Phrasemes from a cultural semiotic perspective. In H. Burger, D. Dobrovol'skij, P. Kühn, N. R. Norrick (eds.), *Phraseologie/Phraseology: Ein internationales Handbuch zeitgenössischer Forschung/An International Handbook of Contemporary Research* 1: 208-219. Berlin, Walter de Gruyter.

Puşcariu, S. 1922. Expresia 'a făgădui marea cu sarea'. In *Cugetul românesc* I: 395-397.

Puşcariu, S. 1926. *Studii istroromâne* II. București, Cultura Naţională.

Puşcariu, S. 1937. L'expression ' a făgădui marea cu sarea ‹. In *Etudes de linguistique roumaine*: 121-124. Cluj-București, Monitorul Oficial şi Imprimeriile Statului, Imprimeria Naţională.

Puşcariu, S. 1940. *Limba română I. Privire generală*. București, Editura Minerva.

Puşcariu, S. 1976. *Limba română. I. Privire generală*. București, Editura Minerva.

Philippide A. 1927. *Originea românilor* II. Iași, Tipografia 'Viața Românească'.

Spitzer L. 1937. L'expression 'a făgădui marea cu sarea'. In *Bulletin Linguistique* V: 190-195.

Spitzer L. 1938. Sur ' a făgădui marea cu sarea ‹. In *Bulletin Linguistique* VI: 238.

Dictionaries

DLRLC = [Academia Română], *Dicţionarul limbii române literare contemporane* I-IV, Editura Academiei, București, 1957.

HEM = Hasdeu, B. P. 1972-1976. *Etymologicum Magnum Romaniae. Dicţionarul limbei istorice şi poporane a românilor*, I-III. București, Editura Minerva (Ist edition, vol. I: 1885 [1887], vol. II: 1889, vol. III: 1893 [1895].

Zanne, I. 1895-1912. *Proverbele românilor din România, Bucovina, Ungaria, Istria şi Macedonia. Proverbe, zicători, povăţuiri, cuvinte adevărate, asemănări, idiotisme şi cimilituri, cu un glosar româno-frances*, I-X. București, Editura Librăriei Socecu & Comp.

[7] The structure of *imaginary expression* is used in the sense proposed by Stelian Dumistrăcel (1980: 136-138) who distinguishes between expressions *copies of reality* that originally had an objective function of communication, which subsequently developed, through metaphorization, an expressive value, and *imaginative expressions* (terms of unreal comparisons), which were born as metaphors.

Literature

Black Sea Salinity as a Reflection of Environmental and Climate Conditions in Ovid's Poems During the Exile Period in Tomis (SE Romania)

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Abstract

The harbour-city of Tomis, currently known as Constanța, located on the western Black Sea coast (the current Romanian territory) was constituted during the Greek colonisation (7th and 6th centuries BC). The description of the geographical and social space around Tomis by the Latin poet Ovid, sent to exile in this region in the early 1st century AD, probably makes the Roman period of the settlement the best-documented one. However, it has been considered for a long time that Ovid distorted the reality of inhabitation favourability at the north-eastern limit of the Roman Empire. For this reason, most historians have ascribed the grim passages related to the desolate landscape at the Pontus Euxinus to the *relegatio* status of the poet. Beyond Ovid's complicated social conjecture, though, he made a series of interesting observations related to both the unusual salinity of the Black Sea and climatic phenomena associated with it. Contrasted to the environmental conditions on the familiar Mediterranean shores, he makes several statements related to the fact that in Tomis [...] *the wealth of so many waters corrupts the waves which it augments, not allowing the sea to keep its own strength* (Ov. *Pont*. IV, 10, 57-64), or that [...] *the fresh water floats upon the flood, being lighter than the sea-water which possesses weight of its own from the mixture of salt* (Ov. *Pont*. IV, 10, 57-64). From a scientific perspective, the explanation of this phenomenon relies on the low salinity of the Black Sea (17.0‰ – 18.0‰). It accounts for the largest low-salinity water basin of the world, compared to the Mediterranean Sea, with a double salinity than the Pontus (39.0‰). Furthermore, Ovid makes several statements related to the fact that seawater freezes in winter (a most unusual event): [...] *I have trodden the frozen sea, and the surface lay beneath an unwetted foot* (Ov., *Tr*. III, 35-40). Although such extreme climatic events are often favoured by the dislocation of Danubian sconces and the transportation of ice-floes southwards to the western Black Sea coast, it may be assumed that Ovid described, not necessarily in an exaggerated manner, a natural phenomenon. Thus, this paper aims to debate using inter- and transdisciplinary arguments the paradigm related to the role played by the salinity of the Pontus Euxinus in the climatic and environmental conditions at the ancient Tomis shoreline. It also aims to identify, as much as possible, the limit between geographical reality and lyrical exaggeration in Ovid's lines.

Keywords: Black Sea salinity, Danuvius Delta, shoreline environment, winter climate conditions, freshwater resources, the ancient harbour of Tomis, the Latin writer Ovid.

The ancient city of Tomis (Τόμις / Τομεύς / Τομέοι / Tomoe / Tomis, Str., *Geog.* VII, 6, 1; Pomp. Mela, *Chorogr.*, II, 2, 22; Ptol., *Geog*., III, 10, 3), colony of Miletus, was founded during the Greek colonisation on the western Black Sea coast between during the 6th century BC, along with other important cities as Istros or Orgame (Bărbulescu and Buzoianu 2001). The Roman period of the Tomis harbour is probably the best known in scientific literature due to the writings of the Latin poet Ovid. He was sent to exile in the Tomis region in the early 1st century AD (Figure 1a). Ovid's description of the geographical and social space around Tomis is sombre and depressing. From the perspective of habitation continuity, Tomis has a long history, and it was inhabited, more or less intensely, from its foundation to the present (Figure 1b). Nowadays, Constanța represents the largest urban agglomeration on the Romanian coast of the Black Sea, and it is the 5th city in Romania in terms of inhabitants.

From a geographical perspective, the Greek colony of Tomis was situated on a peninsula southweast from the Danubian (Danuvius) mouths, where shore morphology was favourable for the placement of the harbour and the city. The hosting conditions provided effective protection against the northern and eastern winds, and the high cliffs of the peninsula were relatively easy to protect against attacks by land and by sea (Romanescu 2009). Currently, this headland is known as Capul Midia (Figure 2). According to Strabo's writings, Tomis was 250 stadia south of Histria (28.7 miles) and 280 stadia north of Kallatis (32.1 miles). According to Arrian's description, the colony was 300 stadia (34.4 miles) away from both colonies (Figure 1b). In addition, the site is located at the outlet of the Carasu Valley, which in Antiquity formed a natural trajectory on the East-West direction, namely from the Danube (Danuvius) to the sea. In the Communist period, the Carasu Valley was transformed into a navigable channel to facilitate a shorter itinerary of the fluvial transport ships from the Danube towards the Constanța harbour, thus avoiding a long and sinuous road through the Danube Delta and subsequently by sea (Figure 1b) (Romanescu 2013).

Figure 1. a) Maximum extent of the Roman Empire with the location of the study area discussed in the text; b) The current Black Sea shoreline on the territory of Romania and location of the main ancient cities - the ancient harbour of Tomis is highlighted with red square.

Figure 2. The geographical location of the Tomis (red square) and Histria territories on the current Black Sea shoreline and Razim-Sinoie Lagoon System (Halmyris Limne / Bay in the ancient times).

In what concerns the magnitude of the rural territory around the city-harbour of Tomis, data are most of the time uncertain. From a geographical perspective, the northern limit of the ancient city of Tomis corresponded to the southern bank of Lake Tasaul. This statement is supported by an inscription found in Capidava (a Roman city next to Tomis situated northwest on the Danubian bank), indicating the eastern limit of the territory or on the Casimcea River, a water stream supplying Lake Tasul. Some archaeological discoveries (mainly Greek and Getian ceramic dated between the 4th century BC - 1st century AD) indicated habitation traces on both the south-western and northern banks of Lake Siutgiol. Such traces were also found in the Capul Midia area. To the south, the territory could have extended to the former Lake Agigea, today incorporated in the modern channel joining the fluvial Danube to the Black Sea. However, whereas the limit suggests a natural border between the territories corresponding to the colonies of Tomis and Kallatis, the archaeological discoveries on the bank of Lake Techirgiol indicated, it appears, a larger extension of the Tomis *chora*. In what concerns the western limit of the agricultural area of Tomis, it corresponds at least to the current placement of the Valul lui Traian locality and maybe even more westwards, if we admit the removal of the morphological indicators specific to the current landform, as in the case of the other limits (Figure 2) (Romanescu 2009; Romanescu and Bounegru 2009; Romanescu et al. 2015; Vespremeanu-Stroe et al. 2013).

From the perspective of the geographical landscape, the information related to the placement of the Greek colonies is relatively clear. However, Ovid makes a much more interesting description in the early 1st

century AD on certain specific elements related to environmental conditions. Not seldom, he refers in his poems to the challenging climatic conditions near Tomis. Moreover, in several excerpts, he accentuates the precarious quality of the water resources at the Danubian mouths. For a long time, it was considered that Ovid exaggerated the sombre description of habitation favourability on the western Black Sea shore, maybe in a wish to be repatriated from exile. However, beyond the social condition of the Latin poet (*relegatio*) and his repeated attempts of re-entering the graces of Augustus and then Rome, it may be stated that he made at the level of Antiquity several observations related to sea salinity and the associated climatic phenomena. In antithesis with the environmental conditions on the Mediterranean banks, the most relevant passages indicating the salinity of the Pontus Euxinus (Black Sea) waters are: *Moreover, here the rivers mingle in the landlocked Pontus, and the sea loses its own power because of many a stream* (Ov. *Pont*. IV, 10, 45-46). *[...] countless others of which mightiest of all the Danube refuses, O Nile, to yield to thee. The wealth of so many waters corrupts the waves which it augments, not allowing the sea to keep its own strength. Nay, like to a still pool or a stagnant swamp its colour is scarce blue and is washed away. The fresh water floats upon the flood, being lighter than the sea-water which possesses weight of its own from the mixture of salt* (Ov. *Pont*. IV, 10, 57-64). *There is in sweet water a pleasure that stirs no envy; I drink marshy water mingled with the salt of the sea.* (Ov. *Pont*. II, 7, 73-74) (Figure 3).

The persistent question in this context is whether the poet Ovid exaggerated this description. From a scientific standpoint, the answer is no! With an average salinity of 17.0‰ – 18.0‰, the Black Sea comprises typical low-salinity waters, accounting for the largest low-salinity water basin of the world. For a simple comparison, the Mediterranean Sea has a double salinity to the Pontus (namely, 39.0‰). The main factors contributing to the low value of salinity are the freshwater inputs of the aquatic ecosystem. Hence, in the surface layer, salinity increase may be produced by the evaporation or frost phenomena, while salinity decrease is determined by the atmospheric precipitations, the Danubian freshwater input or the early defrosting of continental waters. Ovid has pointed out this phenomenon accurately: [...] *the sea loses its own power because of many a stream.* (Ov. *Pont*. IV, 10, 45-46). Sea salinity is also influenced by currents regime and by the water mass mixing phenomena: [...] *The wealth of so many waters corrupts the waves which it augments, not allowing the sea to keep its own strength.* (Ov. *Pont*. IV, 10, 59-60).

According to the latest studies carried out in the coastal area of Constanța (Tomis), the surface waters record a salinity between 0.12‰ – 19.64‰ (average: 13.92‰, median: 14.67‰, std. dev.: 3.36‰), while 77% of the values range from 12.0‰ to 18.0‰ (Mihalov et al. 2016). From here, due to the existence of the compensating littoral current on the bottom layer, on the south-north direction, with an input of high-salinity water of a

Figure 3. The geographical location of the Danivius (Danube) Delta indicating the position of the Danuvius (Danube) outflows in Pontus Euxinus (Black Sea).

Mediterranean origin from the Bosphorus strait, of the density differences and the upwelling and downwelling phenomena, the southern area of the Romanian littoral (the Mangalia / Kallatis sector), the surface waters move from the shoreline out to sea; the salinity values may reach 15.0‰ (Mihalov et al. 2016). Near the deltaic shoreline, the salinity of waters has a value of only 10.5‰. At the beginning of the cold season, the decrease in Danubian freshwater input and the extension of the cooling period leads to a deeper thermocline. The 12.0‰ isohaline marks (at the surface) the front between the transitory marine waters and the coastal and central waters. In the winter and spring, under the influence of the increased fluvial input, this isoline delimits a wider area to a region near the coastal barrier separating the Razim-Sinoe Lagoon System (Halmyris Limne / Bay) from the Black Sea (Mihalov et al. 2016) (Figure 4). In the summer and autumn, this line limits the low-salinity area at the level of the Danubian mouths (Kalon Stoma – Chilia; Narakon Stoma – Sulina; Peukes/Hieron

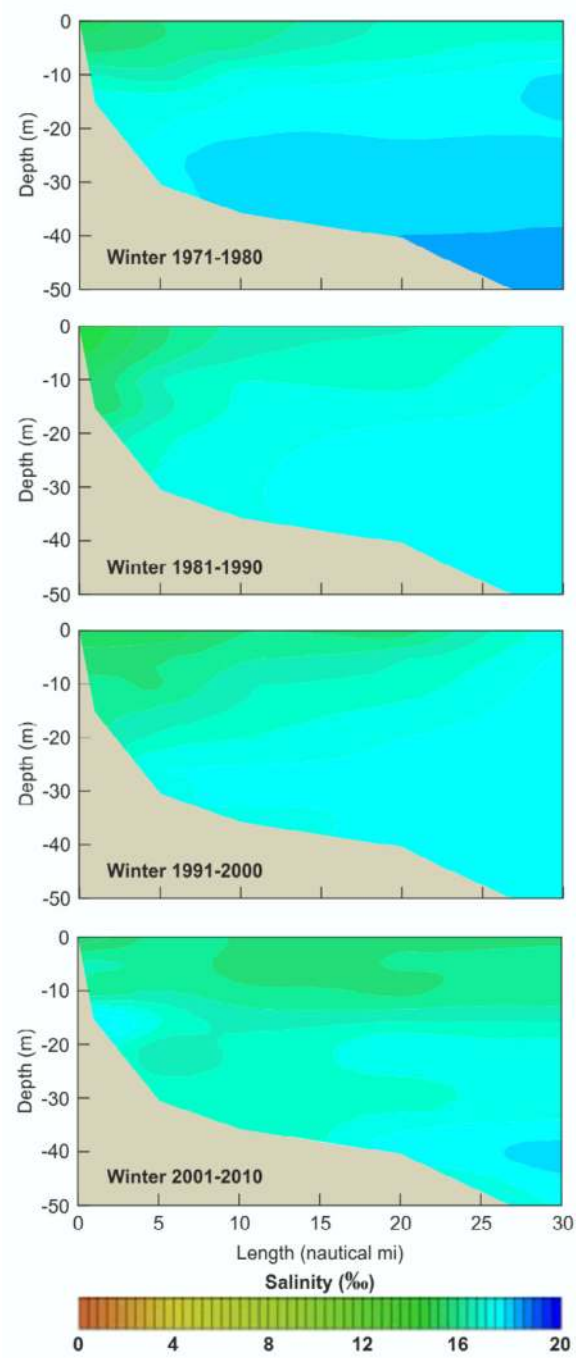

Figure 4. Winter distribution of the decadal average salinity at the Offshore Constanța stations, between 1971 – 2010 (after Mihalov et al. 2016).

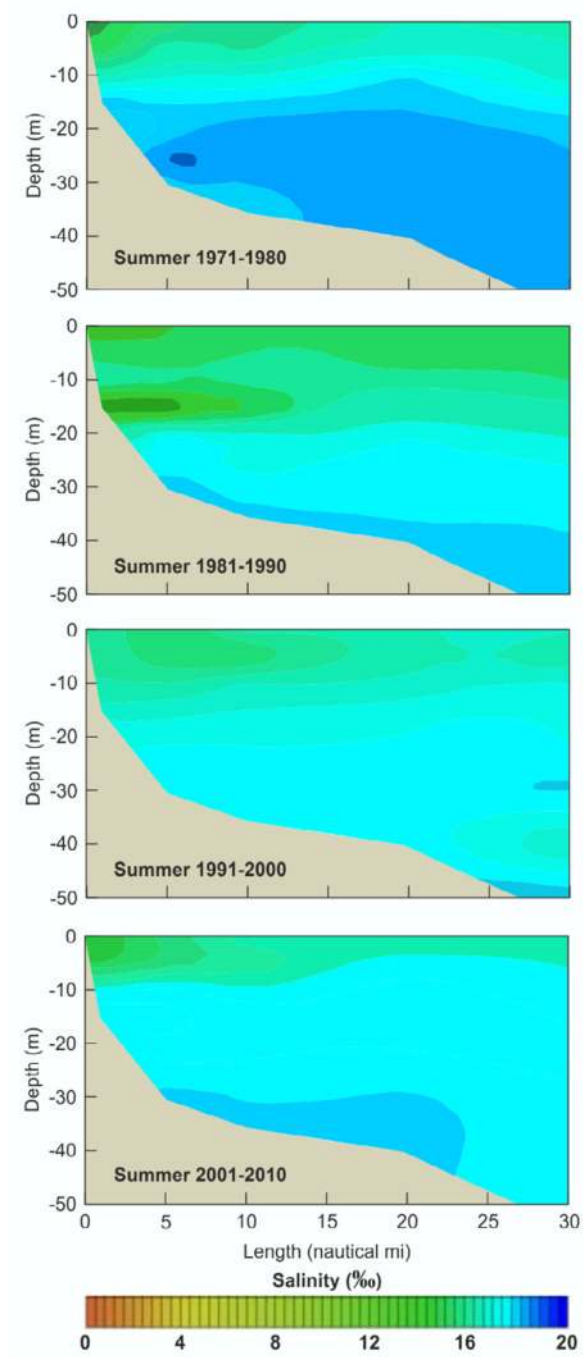

Figure 5. Summer distribution of the decadal average salinity at the Offshore Constanța stations, between 1971 – 2010 (after Mihalov et al. 2016).

Stoma - Sf. Gheorghe) (Mihalov et al. 2016) (Figure 5). For this reason, Ovid said – most likely concerning the waters of Halmyris Limne/ Bay – that [...] *Nay, like to a still pool or a stagnant swamp its colour is scarce blue and is washed away. The fresh water floats upon the flood, being lighter than the sea-water which possesses weight of its own from the mixture of salt*. (Ov. *Pont*. IV, 10, 61-64).

The minimal values of the Black Sea water salinity are recorded, irrespective of the season, in the transitory marine waters under the direct influence of the continental input. The distribution of less saline waters at the level of the Danube Delta front is due to the fluvial fans, as Ovid also mentions, [...] *here the rivers mingle in the landlocked Pontus.* (Ov. *Pont*. IV, 10, 45-46). From here, they are integrated into the general zonal circulation of surface marine currents in the north-south direction. Because freshwaters float at the surface of the water in the coastal area and sometimes they mix with the low-salinity waters inside the coastal shorelines, Ovid states as follows: [...] *The wealth of so many waters corrupts the waves which it augments, not allowing the sea to keep its own strength.* (Ov. *Pont*. IV, 10, 59-60). He even indicates a contamination of drinking water resources with low-salinity seawaters: [...] *I drink marshy water mingled with the salt of the sea*. (Ov. *Pont*. II, 7, 73-74).

In what concerns the extreme climatic phenomena in the coastal area of the Black Sea, maybe the most spectacular is that of seawater frost, so dramatically described by Ovid. More than a few times, he states that due to the low salinity of the water: *Since I have been by the Pontus' shore, thrice has Hister halted with the cold, thrice has the water of the Euxine sea grown hard* (Ov., *Tr*. V, 10, 1-2); *I may scarce hope for credence, but since there is no reward for a falsehood, the witness ought to be believed I have seen the vast sea stiff with ice, a slippery shell holding the water motionless. And seeing is not enough; I have trodden the frozen sea, and the surface lay beneath an unwetted foot*. (Ov., *Tr*. III, 10, 35-40); *You yourself see the Pontus stiffen with ice*; (Ov. *Pont*. IV, 7, 7); *ask him* [...] *whether I am a liar or the Pontus does indeed freeze with the cold and ice covers many acres of the sea.* (Ov. *Pont.* IV, 9, 81; 85-86); *nothing is farther away than this land except only the cold and the enemy and the sea whose waters congeal with the frost*. (Ov., *Tr*. II, 195-196).

Though these passages may seem exaggerated and, in this case, there is a scientific explanation. From a thermal perspective, the Black Sea presents the particularities of the continental seas located in the temperate area. Their essential characteristic is represented by the significant temperature changes recorded in the superficial water layer between winter and summer. The processes causing the sudden heating and cooling of seawaters are due to the interaction sea – atmosphere, the absorption of sun radiations by the seawaters, atmospheric precipitations, actual radiation and evaporation. Internal processes also have a contribution: turbulent mixing and advection. Hence, the superficial seawater layers have a temperature close to that of air. The small differences are due to the inertia of the aquatic environment in the process of accumulation and release of caloric energy. During the cold season, the spatial distribution of the superficial layer's temperature is homogeneous both in the shore area of the continental platform and in the Danubian area of influence, where the average multiannual temperature is 2.70°C (Mihalov et al. 2016). In these conditions, though frost phenomena are generally rare and limited to a narrow band near the Romanian shore, they occur when water temperature decreases below the seawater freezing point (i.e., below -0.819°C).

According to a recent report, from 1929 to the present, there were 16 temporary seawater frost events, most of them in February (Table 1). These events were often favoured by the dislocation of Danubian sconces and the transportation of ice-floes southwards (to the western Black Sea coast). Whereas one may not forecast a recurrence interval for these processes, in the timeframe analysed, the highest difference between two events was 12 years and the smallest of 1 year. Concerning the timeframe where Ovid was exiled at Tomis, namely 9-10 years, and to his statement: [...] *Since I have been by the Pontus' shore* [...] *thrice has the water of the Euxine sea grown hard.* (Ov., *Tr*. V, 10, 1-2), it may be assumed that he described, without exaggerating necessarily, a geographical reality. Furthermore, the statement related to the frozen shoreline surface: [...] *Pontus does indeed freeze with the cold and ice covers many acres of the sea*. (Ov., *Pont*. IV, 9, 81; 85-86) seems real. According to the measurements made in the last 90 years, the width of the ice ranges from a couple of hundred metres to over ten marine miles out to sea. At the same time, the shape of the ice-pack may vary from thick agglomerations of irregular sconces of a fluvial nature subsequently compacted at the seashore to almost circular mounds with over-elevated edges formed and fixed locally. In the last case, ice thickness is low; its formation reduces drastically heath losses on the sea surface. It may be deduced that Ovid, when he stated: [...] *I have seen the vast sea stiff with ice, a slippery shell holding the water motionless. And seeing is not enough; I have trodden the frozen sea, and the surface lay beneath an unwetted foot* (Ov., *Tr*. III, 10, 35-40), was the witness of a frost caused by the dislocation of Danubian frost phenomena and their accumulation on the Tomis shore or in the vicinities of the city. Although it may only look like a supposition, the fact that he stepped on the frozen sea denoted a considerable ice thickness given that it supported his bodyweight. The thickness is specific to the first category of icepack described above.

Perhaps the most eloquent text penned by Ovid in what concerns the climatic conditions of the cold seasons on

Table 1. Frequency of the Black Sea water frost phenomenon in the coastal area of Constanța harbour in the last 90 years according to open-source climatic data of National Institute for Marine Research and Development 'Grigore Antipa', Romania.

Year	Time of frost occurrence		$T_{min.}$ air (°C)	Ice bridge thickness (m)	Ice width (nmi)
	Date	Days			
1929	01 Jan. – 28 Feb.	58	-25.0	2.0	-
1933	01 Feb. – 15 Feb.	15	-17.5	-	> horizon
1938	01 Feb. – 15 Feb.	15	-19.7	0.6	4
1942	01 Feb. – 15 Feb.	15	-24.7	0.8	9
1948	20 Jan. – 10 Feb.	20	-10.2	1	-
1954	02 Jan. – 20 Feb.	18	-18.8	2	15
1956	03 Feb. – 12 Feb.	9	-9.2	-	1
1963	01 Jan. – 20 Jan. 06 Feb. – 14 Feb.	28	-16.1 -1.4	0.5 0.5	1 1
1972	06 Jan. – 29 Jan.	23	-5.0	0.7	1
1985	14 Jan. – 24 Jan. 11 Feb. – 16 Feb. 28 Jan. – 31 Mar.	47	-13.5 -16.7 -13.3	0.7 1.0 1.0	0.15 2.7 3.0
1987	20 Jan. – 28 Jan. 04 Mar. – 07 Mar.	11	-6.0 -12.6	1.0 0.5	1 0.15
1996	31 Jan. – 16 Feb.	16	-11.9	0.75	> horizon
2003	13 Feb. – 28 Feb.	16	-11.6	0.5	0.5
2006	19 Jan. – 16 Feb.	29	-17.5	0.7	1.2
2010	24 Jan. – 05 Feb.	13	-17.8	0.3	0.16
2011	03 Feb. – 07 Feb.	5	-7.0	0.1	0.03

the Pontus Euxinus shore is that of *Tristia* III, 10, 43-54: *At such times the curving dolphins cannot launch themselves into the air; if they try, stern winter checks them; and though Boreas may roar and toss his wings, there will be no wave on the beleaguered flood. Shut in by the cold the ships will stand fast in the marble surface nor will any oar be able to cleave the stiffened waters. I have seen fish clinging fast bound in the ice, yet some even then still lived. So whether the cruel violence of o'ermighty Boreas congeals the waters of the sea or the full waters of the river, forthwith when the Hister has been levelled by the freezing Aquilo the barbarian enemy with his swift horses rides to the attack* (Ov., *Tr*. III, 10, 43-54). It is worth stating that the dolphins of the Mediterranean Sea, to which Ovid was probably familiarised, are probably much different from those of the Black Sea. These differences concern both the significant number of species (the Mediterranean Sea comprises 14 species compared to the Black Sea with only three *taxa*) and the size, weight and colour. The species within the Pontic basin are subspecies of the Mediterranean ones. It is worth noting that, in the wintertime, the highest temperatures are recorded along the shores of Crimea and the Caucasus. It is also why, in these areas, there is a maximum concentration of ichthyofauna and implicitly of dolphins belonging to the three Pontic spaces. In the hot seasons of the year, following the currents taking the food with them, dolphins are encountered across the entire Black Sea, even the whole coast. Hence, what Ovid attributed to the frost was only a natural migration of the dolphins towards the warmer shores and less deep waters, corresponding to the continental platform from the northwest. However, the statement: [...] *I have seen fish clinging fast bound in the ice, yet some even then still lived.* (Ov., *Tr*. III, 10, 49-50) is as real as possible. This phenomenon also occurs currently, mostly on the Danubian course and sometimes within the littoral coastal lines due to the sudden water frost. Often, besides fish and amphibians, even some birds hibernating in the Danube Delta lakes and the Razim-Sinoe Lagoon System are surprised by these extreme phenomena.

It is also worth highlighting that [...] *forthwith when the Hister has been levelled by the freezing Aquilo the barbarian enemy with his swift horses rides to the attack* (Ov., *Tr*. III, 10, 53-54). It is well-known that Istros was a natural barrier between Scythia Minor and the barbarian provinces from the west. For this reason, Romans had notable reasons to fear the rapid incursions of these populations favoured by the formation of the ice bridge over the Danube. Hence, the fear generated by water frost described in Ovid's texts represents both a social truth and a geographical reality in the Roman period of Tomis.

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Ancient literary sources

Ovid. *Tristia. Ex Ponto*. With an English translation by Arthur Leslie Wheeler, Cambridge, 1959.

References

Bărbulescu, M. and L. Buzoianu. 2001. Tomis. In V. D. Grammenos, E. K. Petropoulos (eds.), *Ancient Greek Colonies in the Black Sea 2* (2 vols.). Oxford, British Archaeological Reports International Series 1675: 287-336.

Romanescu, G. 2009. The geomorphological evolution of the Razime-Sinoie barrier spit during the historical periods. *Pontica* 42: 493-517.

Romanescu, G. 2013. Geoarchaeology of the ancient and medieval Danube Delta: Modeling environmental and historical changes. A review. *Quaternary International* 293: 231-244.

Romanescu, G. and O. Bounegru. 2009. The dynamics of the north-western delta littoral of the Black Sea during historical periods (Danube delta). *Pontica* 42: 519-527.

Romanescu, G., Bounegru, O., Stoleriu, C. C., Mihu-Pintilie, A., Nicu, C. I., A. Enea, and C. O. Stan. 2015. The ancient legendary island of PEUCE – myth or reality? *Journal of Archaeological Science* 53: 521-535.

Vespremeanu-Stroe, A., Preoteasa, L., Hanganu, D., Brownc, A. G., Bîrzescu, I., P. Toms, and A. Timar-Gabor. 2013. The impact of the Late Holocene coastal changes on the rise and decay of the ancient city of Histria (southern Danube delta). *Quaternary International* 293: 245-256.

Mihailov, M-E., Ștefan, S., V. Diaconu, and L. Lazăr. 2016. Longterm variability of the water mass structure on the Romania Black Sea shelf. *Romanian Reports in Physics* 68: 377-392.

Salt in Ancient *Opsartytikón* Literature

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Abstract

The author of this paper aims to indicate and analyze the information about the usage of salt in ancient *opsartytikón biblíon,* the Greek name for a kind of literature, namely the cookbook. The remaining pieces of opsartytique Greek literature are very scarce, but its influence is manifested in the Roman cookery books, where many references about the usage of salt can be found. It is well known that the physician Hippocrates, putting a particular emphasis on nutrition, considered each sort of food, inclusive salt, a substance by which human health is maintained or restored. In addition, it is of the utmost importance that this Hippocratic doctrine has become commonly accepted in the medical milieu and therefore has resulted in a considerable and permanent interest in food on the part of his Greek and later Roman followers. Food along with its medical properties (including dietetic ones) is also part of a discussion by Anthimus in *De observatione ciborum,* a *sui generis* mélange of medical and gastronomic knowledge, which in a brief brings the knowledge of generations down to practical suggestions concerning healthy nutrition and recommends the use of 'pure salt' (*sal purus*) to cook the food. It should be noted that references to the therapeutic role of food is also visible in the sole ancient cookery book that has survived until present times, known under the Latin title *De re coquinaria*. Its authorship is attributed by tradition to a certain Marcus Gavius Apicius, a Roman gourmet who lived at the beginning of the 1st century A.D. *De re coquinaria* contains some information on the usage of salt for consumption purposes in Roman cooking and also a prophylactic recommendation. *Sales conditi* (herbal salts) are an example of a food additive to which medicinal properties were ascribed; according to Apicius, herbal salts facilitated digestion, counteracted indigestion and had a purgative effect; they were also supposed to prevent 'all illnesses' (*omnes morbi*), epidemic diseases and fevers. Thus, salt would not only improve taste, but also facilitate the digestive process and the purging of the organism. Similar spice mixes may be found in the works of Aetius of Amida, who left us three recipes for salt with vegetable additives, which he collectively called 'purifying salts' (*hales katharktikoi*).

Keywords: salt, opsartytikón, cookbook, gastronomy, nutrition.

Opsartytikón (Gr.Ὀψαρτυτικόν < ὄψον 'food'; ἀρτύω 'to prepare'), implied *biblíon* (Gr. βιβλίον 'book'), is the generic title of some cookbooks written by ancient authors (Mithaikos, Herakleides) and cited by the Greek grammarian **Athenaeus of Naucratis** (Ἀθήναιος Ναυκρατίτης) in the book *The Deipnosophists* (Δειπνοσοφισταί). Athenaeus' work – penned in the 3rd century AD in Rome – comprises 15 books or chapters, where those who attend the fictional banquet of the Sophists approach numerous topics, including a detailed presentation of Greek gastronomic literature and precious information on cookbooks, (τὰ ὀψαρτυτικὰ βιβλία) most of them now lost. The multitude of citations from these books represent a true gastronomy treatise, including recipes for various favourite Greek meals, information and advice on the use of spices, among which 'salt' – ἅλς, usually employed as a plural, ἅλες – holds an important place. For instance, figs contain 'salt' naturally (μεθ' ἁλῶν) and thus help digestion (79b); 'a fair quantity of salt' (113,b: ἁλσὶν ἀρκετοῖς) is necessary to make bread, while of a fish species called *delcanus* they say that 'when pickled and salted it is very good indeed for the stomach' (118 b: ταριχευόμενον εὐστομαχώτατον εἶναι). The same part (III,120 a) also states that Athenians had become so fond of salt-fish (*philotárichoi*), that they granted citizenship rights to the sons of a merchant who first introduced the practice of 'pickled fish' (*tárichos*) in Athens.

Among the authors cited by Athenaeus, I mention the Sicilian-born Greek poet and gourmand **Archestratus of Gela**, dubbed a 'culinary sage' (101 b; 399d: ὀψοδαίδαλος), said to have sailed around the inhabited world (116 f) and to have visited several countries in order to discover their culinary traditions worth taking over and highlighting; the fruit of his gastronomic adventures is the poem cited by Athenaeus as *Gastrology* (104 b) or *Gastronomy* (4e; 56c), also known as *Hedypátheia*, *Opsopoiía* or *Deipnología* (Schoell 1824, 136). It was written in 330 as a comic epopee, an authentic illustration of the σπουδογέλοιον genre (a mixture of serious and humorous fiction). The 60 surviving fragments (334 lines) of this epopee are dispersed throughout Athenaeus's work. However, they can be found in the same place in the volume *Poetae bucolici et didactici* (Firmin-Didot 1846). He reproduces these lines under the title *Carminum nonnullorum rem naturalem vel medicam spectantium reliquiae Archestrati Geloi aut Syracusii : E Carmine cui titulus deliciae vel ventris leges, vel ventris disciplina, vel dapum disciplina, vel opsoniorum apparatus, vel opsoniorum disciplina quae supersunt.* Actually, this Epicurean-educated author was the one

who coined the term *gastronomy* (Gr.γαστρονομία), seen as the 'art of regulating the stomach' (γαστήρ 'stomach'; νόμος 'governing law, rule'), of putting food in the service of human life. Several centuries later, Brillat-Savarin provided a similar definition: 'Gastronomy is the reasoned comprehension of all that relates to the nourishment of man. Its aim is to procure the preservation of man by means of the best possible nourishment' (Brillat Savarin 1885-1886: 56; Davies transl. 2002: 35). Archestratus is decidedly against any gastronomic tricks, which were the trend of his period, and he recommends a return to the original way of preparing food, to the natural taste of ingredients and mostly to a minimum exposure of food to fire. Hence, he adheres to a short-lived movement organized against the Hippocratic doctrine of πέψις ('baking'/'boiling'), according to which eating raw food or cooking it partially was a barbaric practice.[1] Archestratus claims a new way of cooking, based on simplicity and natural ingredients. Among others, he considered the use of salt a genuine gastronomic pillar. In this sense, let us see his recipe for cooking rabbit (399d-e): 'It's best to roast it on a spit, taking it off the fire while it's a bit rare, while it's still hot, serve it with a pinch of salt while everyone's drinking. [...] Any other way of cooking rabbit, in my estimation, is way too fancy'. Besides the generic term ἅλς, the poem of the Sicilian gastronomist also features the specialized term τάριχος, which initially designated any salt-based dish (salt meat or fish), but which ended up designating exclusively salted or cured fish, while the derived verb ταριχεύω designates the use of salt to preserve various types of meat. In Latin, τάριχος is translated by *salsamentum* ('brine'), a word that preserves, on principle, the original meaning of the Greek term, but which is frequently employed to refer to salt fish. As a fine connoisseur of the greatest pleasures gastronomy had to offer, Archestratus mentions three types of *tarichos*: salted (τάριχος τέλειον), half salted (ἡμιτάριχος) and slightly salted (ἀκρόπαστος). In a fragment cited by Athenaeus (117a), Archestratus praises the Sicilian *tárichos*, half salted for three days and then preserved in amphorae filled with brine. Another term that Archestratus uses for food preservation using salt is the adjective νεαλής,-ές, which initially meant 'young, fresh' but, as it was not related by folk etymology with ἅλς, it ended up also meaning 'freshly salted'. Paul Chantraine noticed that for the Sicilian poet νεαλὴς τύρος means 'the cheese that recently absorbed salt' (ὁ νεωστὶ τοὺς ἅλας πεπασμένος) (Chantraine 1975: 79-80). Much unlike Archestratus, Aristotle – his contemporary – believed boiling was superior to baking, because the first eliminates completely the rawness of meats. Hence, the same epoch comprised two different views of cooking food, which would confront or conciliate over time. Given his obsession for all things natural, it was difficult for Archestratus to make himself heard and understood, because the apology of minimal food cooking that he supported would actually shock the Greeks. For them, it was hygienically imperative to cook the food by long-term exposure to fire; according to their dietary principles, digestion – associated with cooking – started in the kitchen, hence the importance of boiling or cooking food.

Even in Italy, Archestratus theory failed to succeed; here, once they discovered the delights of gastronomy, the Roman gourmands began appreciating culinary tricks and metamorphoses. After conquering Greece, Romans also borrowed gastronomy from them and then refined it gradually. The historian Titus Livius (*Ab urbe condita*, XXXIX, 6, 6-9) posits that Greek cooks came to Rome in the 2nd century, which entailed a significant change in Roman attitudes towards kitchen matters; regarding this situation, the author foresees 'the germs of the luxury to come' (*semina futurae luxuriae): Epulae quoque ipsae et cura et sumptu maiore apparari coeptae. Tum coquus, vilissimum antiquis mancipium et aestimatione et usu, in pretio esse, et quod ministerium fuerat, ars haberi coepta. Vix tamen illa quae tum conspiciebantur, semina erant futurae luxuriae* ('Planned with both greater care and greater expense. At that time the cook, to the ancient Romans the most worthless of slaves, both in their judgment of values and in the use they made of him, began to have value, rather than a mere necessity. Yet those things which were then looked upon as remarkable were hardly even the germs of the luxury to come'). In the 1st century AD, Roman culinary refinement had reached its climax, but Seneca blames precisely the gastronomic progress and the rising number of cooks for the increased rate of diseases (*Epistulae ad Lucilium*, XIV, 95, 23): *Innumerabiles esse morbos non miraberis: cocos numera. Cessat omne studium et liberalia professi sine ulla frequentia desertis angulis praesident; in rhetorum ac philosophorum scholis solitudo est: at quam celebres culinae sunt, quanta circa nepotum focos <se> iuventus premit*! ('You need not wonder that diseases are beyond counting – count the cooks! All intellectual interests are in abeyance; those who follow culture lecture to empty rooms, in out-of-the-way places. The halls of the professor and the philosopher are deserted; but what a crowd there is in the cafés! How many young fellows besiege the kitchens of their gluttonous friends!').

The Roman kitchen is featured in texts penned by writers such as Varro, Columella, Pliny the Elder, Petronius, and mostly in the only well-preserved cookbook dating to Antiquity, known as *De opsoniis et condimentis sive de arte coquinaria libri decem*. This compilation comprises around 500 culinary recipes and

[1] The renowned French anthropologist Claude Lévi-Strauss reprises this idea in the 20th century; he contends that the raw/cooked dichotomy differentiates primitive from cultivated civilizations, marking the passage from nature to culture; according to his famous culinary triangle, (raw/cooked/rotten), cooking food is more culturally marked if it involves a more complex elaboration, mediated by a variety of ingredients and tools (Lévi-Strauss 1995: 354).

it was written in the 4th century AD, seemingly based on a book by **Marcus Gavius Apicius**, a famous 1st-century AD gastronomist who worked in the service of Emperor Tiberius. Seneca used only derogatory terms for him: 'Apicius [...], who in this very city, which at one time the philosophers were ordered to leave, as being 'corruptors of youth,' as a professor of the science of the cook-shop defiled the age with his teaching' (*Consolatio ad Helviam*, X, 8-11: *Apicius nostra memoria vixit, qui in ea urbe ex qua aliquando philosophi velut corruptores iuventutis abire iussi sunt scientiam popinae professus disciplina sua saeculum infecit*). Seneca was equally severe concerning the food habits of his contemporaries: 'they vomit that they may eat, they eat that they may vomit, and they do not deign even to digest the feasts for which they ransack the whole world' (*Ibidem*: *vomunt ut edant, edunt ut vomant, et epulas quas toto orbe conquirunt nec concoquere dignantur*). Seneca's contemptuous regard actually reduces culinary art to perpetual bulimy. Another Apicius – Caelius Apicius, who lived in the 4th century AD – is sometimes mentioned as the author of the aforementioned cookbook; he allegedly reunited culinary recipes from the original author and other recipes conveyed by tradition. In *Apologeticum* (III,6), Tertullianus contends that all famous cooks were named Apicius, just as the followers of famous philosophers or grammarians took the name of their master: *Quid novi si aliqua disciplina de magistro cognomentum sectatoribus suis inducit? Nonne philosophi de auctoribus suis nuncupantur Platonici, Epicurei, Pythagorici? [...] Æque medici ab Erasistrato et grammatici ab Aristarcho, coqui etiam ab Apicio?* ('What novelty is it, if some way of life gives its followers a name drawn from their teacher? Are not the philosophers called after their founders – Platonists, Epicureans, Pythagoreans? And physicians in the same way from Erasistratus, and grammarians from Aristarchus – cooks too from Apicius?'). It is true that Pliny the Elder cites several persons named Apicius as specialists in culinary specialties (*Historia naturalis*, VIII: 77; IX: 33; X: 68; XIX: 41) and he even mentions 'Apicius's recipe' (*Apiciana coctura*) for steeping cabbages in oil and salt before they are boiled. The first author to mention a recipe by Apicius – very famous during those times (4th century AD) – is St. Jerome. In his work *Adversus Iovinianum* (I: 40), he accused friar Jovinianus of having exchanged dainty dishes for 'the sauces of Apicius'(*ad iura Apici...se conferat*).

Apicius's work is an excellent synthesis of finest Roman cuisine, a testimony of four centuries' worth of Greek- or Mediterranean-inspired culinary inventions. Throughout all of its ten books, it actually becomes clear that salt was used quite rarely in culinary recipes. It is useful to know that Romans used salt in the kitchen as **condimentum** ('for taste') and **pulmentarium** ('for flavour'), in agreement with Plutarchus's observation that 'flavour requires salt to stimulate the sense' (*Quaestiones convivales*, 669 a). In exchange, a far more common ingredient in Apicius's recipes is *garum*, a salt substitute utterly despised by Seneca: 'What? Do you not think that the so-called 'Sauce from the Provinces,' the costly extract of poisonous fish, burns up the stomach with its salted putrefaction?'(*Epistulae ad Lucilium*, XV, 95, 25: *Quid? illud sociorum garum, pretiosam malorum piscium saniem, non credis urere salsa tabe praecordia*?). Apicius also names other salt substitutes: *liquamen*, with a composition similar to that of *garum*, and *allex*; these spices were obtained using heavily-salted fish intestines left to ferment in the sun; the resulting liquid product was then filtered; this was the *garum* or *liquamen*, while the remaining paste was called *allex*; all of them were widely used in the kitchen. However, among the numerous recipes featured in Apicius's book, at least 30 of them include salt per se, under various forms and in variable amounts.

The types of salt indicated are as follows: ***sal communis frictus*** ('common salt crushed'); ***sal frictus et tritus*** ('roasted and crushed salt'); ***sal conditus*** ('spiced salt'). The last is combined with diverse spices (pepper, oregano, thyme or dill seeds) and recommended as panacea – for digestion and for the prevention of many illnesses. The same type of salt with the addition of vegetal substances is called 'purifying salt' (ἅλες καθαρτικοί- *Iatricorum libri*, III: 110; 1-9) by Aetius of Amida.

The amounts of salt within Apicius's recipes are not rigorously provided, but rather indicated: ***sal modicus*** or ***modicum salis*** ('a pinch of salt'); ***sal plurimus*** ('very much salt'); ***pugnus salis*** ('a fist of salt').

Numerous **verbs** are used to indicate the amount of salt necessary for the recipes: ***aspargere/conspergere*** *sale* ('sprinkling salt'); ***mittere*** *salem* ('putting salt'); ***condire*** *sale* ('seasoning with salt'); ***distillare*** *salem* ('spattering salt'); ***assare*** *cum sale* ('roasting with salt'); ***ponere, componere, interponere*** *salem* ('putting, adding salt'); ***decoquere*** *cum sale* ('boiling with salt'). It is worth highlighting that Apicius is preoccupied with avoiding the use of salt, thus indicating various substitutes for it: for instance, traditional meat preservation involved salt, but one of his recipes called *ut carnes sine sale quovis tempore recentes sint* ('to keep meats fresh without salt for any length of time') indicated honey as an ideal option for preserving meat. Furthermore, Apicius often uses the term ***salsum*** for salt fish, used as an ingredient in various recipes, such as the versions *salsum crudum* ('raw fish'), *salsum recens* ('fresh fish'), *salsum coctum* ('boiled or roasted fish'). Known as an adept of culinary mystifications, Apicius even proposes a recipe of 'salt fish without salt' (*salsum sine salso*), some kind of liver pâté (IX: 444): *Iecur coques, teres, et mittes piper aut liquamen aut salem. Addes oleum. Iecur leporis aut haedi aut agni aut pulli, et si volueris in formella piscem formabis. Oleum uiridem supra adicies* ('Cook the liver, crush and

add pepper, either broth or salt. Add oil, liver of hare, or of lamb or of chicken, and, if you like, press into a fish mould. Sprinkle with virgin oil').

The echo of this book crossed several centuries. A proof in this sense is a 6th-century excerpt belonging to the Ostrogoth **Vinidarius**, titled *Excerpta Apicii a Vinidario viro illustri*. It is often published as the 9th book of the work *De re coquinaria*; it is actually a list of ingredients indispensable to any kitchen (*Brevis pimentorum*), followed by 31 recipes, which attest both to the continuity and evolution of Appicius's gastronomy.

The ideas provided by the Greek Archestratus were partially rehabilitated by **Anthimus** (5th-6th centuries**)** during the early Middle Ages. Anthimus was a Byzantine physician who wrote a treatise on dietetics known as *De observatione ciborum*. This is actually an elaborated letter addressed to the Frank King Theodoric I; Anthimus acted for a while as an ambassador at his court (*Epistula Anthimi viri inlustris comitis et legatarii ad gloriosissimum Theudoricum regem Francorum de observationem ciborum*). Initially, Anthimus was persuaded that 'a man's health depends first on proper foods' (*prima sanitas hominum in cibis congruis constat*). Hence, he tried to convince the king of the advantage of boiling or roasting foods; he warned the king that otherwise they cause heaviness in the stomach and in the belly (*si autem non bene fuerint cocti, gravitatem stomacho et ventri faciunt*). However, after noticing that Franks preferred to cook their food minimally, the dietician started making numerous concessions to this 'barbaric' practice. Hence, it is obvious that Anthimus oscillates between recommendations such as *ut longius foco assentur* ('put on the flame and cook slowly') and *frixum vero laredum penitus non praesumendum*, *quia satis nocet* (do not eat fried lard, for it is very harmful). Anthimus's treatise contains a catalogue with 94 foods whose use – raw or cooked – is considered harmful or beneficial for the body. Often, his dietetic recommendations end up being of full culinary recipes, where he also includes how to use spices such as salt, *garum* or *liquamen*. Unlike Apicius, Anthimus recommends the use of 'pure salt' (*sal purus*) to cook the food; he forbids the use of *liquamen* altogether (*Nam liquamen ex omni parte prohibemus*). However, just like Archestratus, he proposes to use salt 'moderately to increase the <natural taste of ingredients>' (*modicum de sale pro sapore faciendum*) (Deroux 2002: 1119). *De observatione ciborum* is more of a dietetic guide than a cookery book. In agreement with Galenus's statement that 'the cure is in the food', (*De alimentorum facultatibus*, 1 : ἐν τροφῇ φαρμακίη) Anthimus ascribes to food the power of preventing all diseases.

As a conclusion, I will cite the motto of Jacques André's book, *L'alimentation et la cuisine à Rome: Les hommes ont toujours trouvé que l'alimentation de leur époque était la meilleure'*. (Men have always found that the food of their times was the best).

References

André, J. 1961. *L'alimentation et la cuisine à Rome*, C. Paris, Klincksieck.

Milham, M. E. 1969. *Apicii decem libri qui dicuntur De re coquinaria* 1969. Leipzig, Teubner.

Apicius, J. A. (ed.) 1974. *L'art culinaire*. Paris, Les Belles Lettres.

Athenaeus, Gulick. C. B. (ed.) 1972. *Deipnosophistae.* Cambridge, Harvard University Press.

Braund, D. and Wilkins, J. (eds.) 2000. *Athenaeus and his world: reading Greek culture in the Roman Empire*. University of Exeter Press, Exeter.

Blanc, N. and Nercessian, A. 1992. *La cuisine romaine antique*. Grenoble.

Brillat Savarin, A. 1885-1886. *Physiologie du goût.* Paris, *Librairie* de la Bibliothèque Nationale.

Chantraine, P. 1975. Sur quelques composés sigmatiques. In *Mélanges linguistiques offerts* à Émile Benveniste: 75-85. Paris, Société de Linguistique de Paris.

Deroux, C. 2002. Anthime, un médecin gourmet du début des temps mérovingiens. *Revue belge de philologie et d'histoire* 80, 4: 1107-1124.

Edwards, J. 1984. *The Roman cookery of Apicius*. London, Rider & Co.

Firmin-Didot, A. 1846. *Poetae bucolici et didactici*. Paris.

Jean-Louis, F. and Massim, M. 1996. *Histoire de l'alimentation*. Paris, Fayard.

Schoell, M. (ed.) 1824. *Histoire de la littérature grecque profane* 3. Paris, Librairie de Gide Fils.

Laurioux, B. 1994. Cuisiner à l'Antique: Apicius au Moyen Âge. *Médiévales* 13, 26: 17-38.

Lévi-Strauss, C. 1995. *Mitologice I. Crud și gătit,* I. Pânzaru (ed.). Bucharest, Babel.

Olson, S. D. and Sens, A. 2000. *Archestratos of Gela*, *Greek Culture and Cuisine in the Fourth Century BCE*. Oxford, Oxford University Press.

Pedrazzini, R. 1996. *Saveurs et senteurs de la Rome Antique: 80 recettes d'Apicius*. Toulouse, Fontan & Barnouin.

Ponsich M. and Tarradell M. 1965. *Garum et industries antiques de salaison dans la Méditerranée occidentale*. Paris, Presses universitaires de France.

Latin Testimonies on the Exploitation of Salt in 17th–18th Century Moldavia

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Abstract

Two important testimonies concerning salt deposits and their exploitation in the Moldavia of the 17th and 18th centuries can be analyzed, for they meet in the works of some authors of the Latin language. One belongs to the Catholic missionary Marco Bandini who, in 1648, in a rapport for Pope Innocent X over his visit in Moldavia, he mentions about the existence of some salt mine around the locality of Trotuş and of a village built on a salt deposit, Sărata, in the neighbourhood of Cotnari. Being interested in the economic realities of the Moldavia from the 17th century, the Catholic monk offers information regarding the quantity and quality of the extracted salt, the internal consume and salt export, workforce and payment method, also attaching a description of the mine from Trotuş. The second proof belongs to the Prince of Moldavia, Dimitrie Cantemir, who created a complex description of Moldavia (*Descriptio Moldaviae*) in 1716, at the request of the Academy from Berlin. The scholar prince dedicated an entire chapter to the description of the mountains and mines from his country (*De montibus et mineris Moldaviae*), emphasizing the richness of salt deposits and their exploitation method. Thus, we have solid proofs of the used techniques, of the economic limits regarding extraction during his time, in connection to previous eras, of salt export and the wealth gained through salt exploitation, about those charged with the administration of the salt mines.

Keywords: salt, latin, Moldavia, Cantemir, Bandini, salt mines.

Information on the existence of rich salt deposits and of intense salt extraction activity in Moldavia during the 17th and 18th centuries is available both from documents and statistics of the era, and in records by local and foreign scholars.[1] Among them are two important testimonies in Latin. One belongs to the Catholic monk of Bosnian origin, Marco Bandini, who in 1648 conducted a visit of the Catholic parishes of Moldavia, from which he wrote a report in Latin for Pope Innocent X.[2] Even though the title of the manuscript is *Visitatio generalis omnium ecclesiarum catholicarum romani ritus in Provincia Moldaviae,*[3] the work is conventionally known as *Codex Bandinus*, after the edition published by V. A. Urechia in 1895.[4] Interested in the realities of the land he treks, Bandini expounds not only on the state of the Catholic churches and communities of the country, but also provides detailed geographical, historical, political-administrative, economic, ethnographic, and cultural information on Moldavia of the 17th century. Another testimony containing references on the minerals of Moldavia and their exploitation belongs to the Moldavian prince Dimitrie Cantemir. A distinguished scholar of his age and member of the Berlin Academy of Sciences,[5] Cantemir produced in 1716 a small work on his homeland, entitled *Descriptio antiqui et hodierni status Moldaviae* (in short, *Descriptio Moldaviae*).[6]

[1] Such information was written down by foreign travellers that visited Moldavia during this period (the Englishman Robert Bargrave in 1652, the Italian Pietro Deodato in 1641, the Syrian Paul of Aleppo in 1653, the Turkish chronicler Evliya Çelebi in 1659, Marco Bandini, etc.). It is not by chance, therefore, that their testimonies were written in various languages (e.g. English, Italian, Turkish, Latin).

[2] For information on the author and his writings, see *Călători străini despre Țările Române*, vol. V, a volume curated by Maria Holban, M. M. Alexandrescu-Dersca Bulgaru and Paul Cernovodeanu, București, Editura Științifică, 1973, p. 293–298.

[3] The Latin text survived in manuscript 80, from the 17th century, and in a copy of it, manuscript 154, made one century later, both found in the collections of the Romanian Academy. Two bilingual editions of this work have been published, one in 1895 by V. A. Urechia, entitled *Codex Bandinus. Memoriu asupra scrierii lui Bandinus de la 1646, urmat de text și însoțit de acte și documente* (București, Litografia Carol Göbl), the other in 2006 (Marco Bandini, *Codex. Vizitarea generală a tuturor Bisericilor Catolice de rit roman din Provincia Moldova 1646–1648*, bilingual edition, Latin text established, translated, glossary by Traian Diaconescu, historical preliminaries by Anton Despinescu, notes and comments by Mircea Ciubotaru, collation of the Latin text by Cristina Halichias, critical apparatus for the Latin text and index of names by Claudia Tărnăuceanu, Iași, Editura Presa Bună, 2006).

[4] I will use employ from now on the abbreviation *Codex* for Bandini's work, but the quotes will be taken from the 2006 edition, indicating the manuscript (ms. 80) page, noted at the margin of the Latin text reproduced in this edition. The examples will be accompanied by my translation.

[5] Cantemir became a member of the Berlin Academy of Sciences in 1714. For his relations with the Berlin Academy, see E. Pop, *Dimitrie Cantemir și Academia din Berlin*, in *Studii. Revistă de Istorie*, 5/1969, p. 825–849; Bahner Werner, *Cantemir și Academia din Berlin*, in *Secolul 20*, 11–12/1973, p. 93–97; Valentina and Andrei Eșanu, introductory study (in Romanian) to the edition *Dimitrie Cantemir, Principele Moldovei, Descrierea stării de odinioară și de astăzi a Moldovei*, introductory study, note on the edition and notes by Valentina and Andrei Eșanu, translation from Latin and indexes by Dan Slușanschi, București, Institutul Cultural Român, 2007, p. 25–36, etc.

[6] For the manuscripts of *Descriptio Moldaviae*, see Valentina and Andrei Eșanu, *op. cit.*, p. 36–62. There are five editions of the Latin text: *Operele principelui Demetriu Cantemiru*, tomu I (*Descriptio Moldaviae*), Bucuresci, 1872, made by A. Papiu-Ilarian; Dimitrie Cantemir, *Descriptio antiqui et hodierni status Moldaviae/Descrierea Moldovei*,

Structured in three parts, *Descriptio Moldaviae* contains a descriptive segment on the geography of the country (which contains a chapter on the mountains and mines of Moldavia), an exposition on the political-administrative organization of the principality, and a part on the Moldavian church and written culture.

If in Bandini's account the use of Latin was foremost due to its quality as the language of the Catholic Church, customarily used for papal reports, for Dimitrie Cantemir — who elaborated his work at the behest of the Berlin Academy, targeting a different, wider public, a secular European intelligentsia — Latin was the universal language of culture. Having this in mind, the expressive differences between the two works, easy to identify, are not too surprising. Conspicuous particularly at the syntactic, lexical and stylistic levels, they are due not only to auctorial habitudes, but also to the time separating the two works. Similarly, the realities of the ground are presented from different perspectives. Bandini is the foreign guest observing from outside, documenting on the spot, often driven by curiosity, relying on information provided by locals and on his own considerations. Cantemir, who even though at the moment of writing was in exile in Russia and accordingly was forced to rely on his memory and any notes he might have carried away with him, nevertheless had access to internal sources, to precise, complete papers, documents and data, and, in particular, had first-hand knowledge of the country in which he was born and which he had ruled (in 1693 and 1710–1711).

Depicting the various areas of Moldavia, both authors found it highly relevant to mention the existence of salt deposits near the settlement of Trotuș, the exploitation of which brought notable benefits both to the authorities and the locals: 'finally, westwards of the town of Trotuș there is a saltmine in the mountain's side' – *Codex*, 50 – *Tandem versus occasum Tatrosiensis Oppidi est salis fodina in latere montis...*; 'in Bacau district, not far from the town of Trotuș, there are very rich saltmines...' – *DM*, A28 – *In Bacoviensi agro, haud procul ab urbe Totrusz, salinae sunt abundantissimae...*; 'Ocna and Trotuș, on the river Trotuș, are mention-worthy only for their extraordinary salt veins, which are found there, in the vicinity' – *DM*, A19 – *Ocna et Trotusz, ad amnem Trotusz, nulla re magis memoranda oppida, quam egregiis salis meatibus, quae ibi, in viciniis reperiuntur.*[7]

We notice the different option of the authors for selecting the terms designating the place from which salt is extracted. Bandini uses for this a syntagm (*salis fodina*), in which *fodina* ('pit', 'mine') requires a determinant in order to signify 'saltmine'. Cantemir, perhaps influenced by the fact that Romanian has a specific word from saltmine ('ocnă'), prefers the term *salinae* ('saltmines', 'saltworks'), attested in Latin with this meaning since the 1st century BC,[8] and avoids *minera*, which he employs for 'mine' in general.[9] With the meaning of 'salt lode', the authors use both *vena*, 'vein, lode' (*novae salis venae* – DM, A 28), and *meatus* 'path, passageway' (*salis meatus inventiantur* – DM, A 28; *egregiis salis meatibus* – DM, A 19). As often done for key words, the scholar-prince also specifies the Romanian equivalent of *salinae*: 'called by the inhabitants *ocne*' – DM, A 28 – *incolis* Ocna *dictae,*[10] probably intending to inform as best as possible the unfamiliar reader. Bandini makes no mention of this Romanian word, which he may not have known.[11] However, he provides a description of the saltwork as it looked in the 17th century: 'the depth of this mine is a hundred *orgiae* and inside it is so large that a fortress could be built' – *Codex,* 50 – *Profunditas huius fodinae est centum orgiarum, tanta vero intus capacitas, ut Civitas condi possit*, where an *orgia*

translation after the Latin original by Gh. Guțu, introduction by Maria Holban, historical commentary by N. Stoicescu, carthographic study by Vintilă Mihăilescu, index by Ioana Constantinescu, with a note on the edition by D. M. Pippidi, București, Editura Academiei R. S. R., 1973 (and second edition, with a Postface by Eugen Simion, critical reception file by Bogdan Crețu, edited by Ana-Cristina Halichias, București, Academia Română, Fundația pentru Știință și Artă, 2014); *Demetrii Cantemirii, Principis Moldaviae Descriptio antiqui et hodierni status Moldaviae/Descrierea stării de odinioară și de astăzi a Moldovei*, critical edition by Dan Slușanschi, București, Institutul Cultural Român, 2006, and Dimitrie Cantemir, *Despre numele Moldovei: în vechime și azi. Istoria moldo-vlachică. Viața lui Constantin Cantemir. Descrierea stării Moldovei: în vechime și azi*, Latin edition, critical apparatus and indices by Florentina Nicolae, translation by Ioana Costa, introductory study by Andrei Eșanu and Valentina Eșanu, București, Academia Română, Fundația Națională pentru Știință și Artă, Muzeul Național al Literaturii Române, 2017. The examples, accompanied by my translation, were extracted from the 2006 edition (*DM*), indicating the page of manuscript A (ms. 1716, currently held by the Institute of Oriental Studies of the Russian Academy of Sciences, Sankt-Petersburg), noted at the edge of the Latin text of the respective edition.

[7] It seems that in the 18th century Ocna quickly developed from a larger village (with three hundred houses, as described by Bandini: (*Pagus trecentas domos complectens – Codex*, 50) to an *oppidum* ('(market) town'). *Cf.* Dumitru Vitcu, *Exploatarea sării în Moldova până la 1828*, in *Anuarul Institutului de Istorie și Arheologie 'A. D. Xenopol'*, XI/1974, p. 18. The urbanisation process occurred in the 17th century on the backdrop of the development of the salt exploitation industry – Corneliu Stoica, *Evoluția localității Tîrgu Ocna în Evul Mediu (până la mijlocul secolului al XVIII-lea*, in *Carpica*, XXI/1990, p. 8. For more on Târgu Ocna, also see Corneliu Stoica, *Valea Trotușului. Enciclopedie*, Onești, Editura Magic Print, 2006, p. 310–314.

[8] Nuria Morère Molinero, *Historical Development of the 'salinae' in Ancient Rome: from Technical Aspects to Political and Socio-Economic Interpretations*, in *Archaeology and Anthropology of Salt: a Diachronic Approach. Proceedings of the International Colloquium, 1–5 October 2008 'Al. I. Cuza' University (Iași, Romania)*, edited by Marius Alexianu, Olivier Weller, Roxana-Gabriela Curcă, Oxford, Archaeopress, 2011, p. 157.

[9] *De montibus et* mineris *Moldaviae – DM*, A 25 – 'On the mountains and mines of Moldavia'; *metallicis... mineris – DM*, A 27 – 'ore mines'; *Praeposito Minerorum – DM*, A 149 – 'the chief of mines'.

[10] The term 'Ocna' had already turned into an oikonym, designating the settlement near the saltmine, as also revealed by Cantemir (*DM*, A 19; *DM*, A 142).

[11] For a discussion on the Romanian linguistic elements in the *Codex*, see Traian Diaconescu, *Elemente de limbă română în manuscrisul latinesc* Codex Bandinus (1648), in *In memoriam I. Fisher. Omagiul foștilor colegi și discipoli*, volume coordinated by Lucia Wald and Theodor Georgescu, Humanitas, București, 2004, p. 131–145.

is a measuring unit equivalent to six feet.[12] Considering the details provided and the considerations of its size, it can be assumed that the Catholic priest personally went down into the mine, out of curiosity or interest,[13] and, lacking the pretensions and scruples of a scientist, he let himself be carried away by the impressions of the moment, which he tried to translate into writing using figures of speech. The mine's impressive size, as well as the richness of the salt deposits are highlighted by means of comparisons and even hyperbole. Besides the statement that the mine was so large on the inside that it would have allowed the erection of a fortress, the friar claims that the piles of salt at the exit were so tall that they looked like walls (*ad orificium exterius sunt ingentes cumuli lapidum salis instar murorum* – *Codex*, 50), while the carts and men transporting them were like ants (*currus et homines asportantes instar formicarum* – *Codex*, 50). This last comparison may be meant to underline not only the huge difference in size, but also, perhaps, the number of people assiduously working in the mine.

The richness of the salt lodes, found near the surface, was also mentioned by Cantemir, who, while using a more tempered tone, more suitable for a work that must exhibit scientific rigour, states that 'these deposits never end...' (*neque unquam deficiunt hi meatus* – *DM*, A 28) despite extracting taking place each day. The salt produced here was, apparently, sufficient to supply internal consumption and for export, bringing considerable income to the state ('these <mines>, which are flourishing, provide plentifully the requisites' – *DM*, A 28 – *ea, quae florent, satis suppeditent necessaria*), without needing to open other exploitation points that might threaten the reference price enforced by the princely monopoly. The scholar then mentions the existence of other mountainous areas where salt abounds, still unexploited: 'in other places too there are found such salt deposits... Whole mountains are in Moldavia, which, if their outer earth cover would be removed, seem to be made entirely of glass' – *DM*, A 28 – *In aliis quoque locis multi tales salis meatus inveniuntur... Montes integri in Moldavia extant, qui, si exterior terrae cortex adimatur, vitrei toti esse videntur.*[14]

With respect to the quality of the salt extracted, Cantemir claims, somewhat boastfully (suggested by the tendency to use superlatives) that it is very clean and transparent, without being mixed with impurities ('you will find a very pure and very translucent salt, similar to crystal or porphyry, not peppered by any particle of dirt' – *DM*, A28 – *purissimum, et christalli, aut porphyri instar pellucidum sal, nullis terreis particulis interstinctum reperies*).[15] It may be a slight exaggeration, considering that Bandini stated that there were also extracted chunks whose colour was darker because of mixing with dirt: 'the colour of some pieces is white, and then salt <is> purer, of others darker, and then it has mixed a lot of earth material' – *Codexi*, 50 – *color quorunda(m) frustorum est albus, et hic purior sal, aliorum obscurus, et hic multum terreae qualitatis admixtum habet.* Despite this, the missionary admits that, once ground, the salt turns immaculately white ('But crushed it turns white as snow, no matter what colour it was before' – *Codex*, 50 – *Verum contusus instar nivis fit albus, cuiscunq(ue) coloris ante fuerit.*). The same author considers it more concentrated than sea salt, a fact proven, he opines, by the need of a minute quantity for giving savour to foods: 'the nature of this salt is much more salty than sea salt, this is why a small quantity is sufficient for preparing the meal and bread' – *Codex*, 50 – *natura huiusce salis est multo acrior sale marino, ideo modicum sufficit ad condiendos cibos et panes.*[16] For designating the salt boulders, Bandini uses the syntagm *salis lapides*, 'salt boulders' (*Codex*, 50), preferring *frustum*, 'piece', when referring to smaller fragments. Cantemir, perhaps influenced by the shape of the boulders, uses the syntagm *salis tabulae*, 'salt tablets' (*salis tabulas extraxerint* – DM, A 28).

With respect to the procedure for extracting salt, Bandini does not go into detail, save for mentioning that the transportation of the salt blocks out of the mine was made using carts.[17] Cantemir on the other hand gives some clarifications concerning the extraction technique at the beginning of the following century. The salt lode, found near the surface, was easily uncovered by removing the layer of earth above ('if you were to remove the earth for one or two cubits' – *DM*, A 28 – *si terram uno alterove cubito submoveas*), without necessitating a special technique ('There it is

[12] Antonius Bartal, *Glossarium mediae et infimae Latinitatis Regni Hungariae,* Lipsiae, MCMI, *s. v. orgia* (*mensura longitudinis sex pedum*).

[13] Dumitru Vitcu, *op. cit.*, p. 17.

[14] Bandini makes only one mention of the existence of another possible rock deposit, when annotating in Latin the name of a settlement found near Cotnari: 'there is a village to the west separated by the the town of Cotnari by a deep valley: Serata, that is to say 'the salted one' or 'the village raised on salt' – *Codex*, 109 – *Est Vicus ad Meridiem profunda distinctus fossa ab Oppido Kutnar. Serata hoc est salsata vel Sale condita villa*. Mircea Ciubotaru, in Marco Bandini, *Codex*, 2006 edition, n. 175, p. 440, dismisses as erroneous the explanation given for the oikonym. In Romanian, 'sărata' means 'salty water', a common designation for brackish creeks.

[15] The same author compares salt, in terms of appearance, not only with crystal and porphyry, but also with glass (*vitreum*), noting that once the layer of earth is removed, some Moldavian mountains 'seem to be entirely of glass' (*vitrei toti esse videntur* – *DM*, A 28). By metonymy, the term *chrystallus* acquires the meaning of 'salt' in the syntagm *columnas huius chystalli* – *DM*, A 28 – 'columns of this crystal' (refering to the 'salt pillars' supporting the galleries).

[16] According to specialists, the salt deposit from Târgu Ocna is of particular purity, with a high content (97.89%) of NaCl (Dorinel Ichim, *Exploatarea sării în Moldova medievală*, in *Sarea, Timpul și Omul*, edited by Valeriu Cavruc and Andreea Chiricescu, Sfântu Gheorghe, Editura Angustia, 2006, p. 125 and 126; also see Corneliu Stoica, *Evoluția localității Târgu Ocna*, n. 14, p. 8).

[17] The technique for exploiting salt in the respective time period was reconstructed by Dumitru Vitcu (*op. cit.*, p. 14 and *Istoria salinelor Moldovei în epoca modernă*, in *Anuarul Institutului de Istorie și Arheologie 'A. D. Xenopol'*, supliment, 1987, p. 29), on the basis of information from the 16th–17th centuries, corroborated by those from the 13th century. Also see Corneliu Stoica, *op. cit.*, p. 25–26.

not needed any special craft for cleaning the salt' – *DM*, A 28 – *Ibi nulla arte ad purgandum sal opus est*). As they advanced along the galleries from which the blocks of salt were extracted, workers left behind pillars from the same mineral to support the roof and the ground above (*etenim, ubicunque salis tabulas extraxerint, subinde columnas huius chrystalli reliquunt, terram et concavitatem istam sustinentes – DM*, A 28), in order to allow and facilitate the unloading of new salt lodes (*ut locum habeant novae salis venae, in quem se exonerent – DM*, A 28). In twenty years, claims Cantemir, the galleries formed were filled again, so that it was no longer visible that they were ever emptied (*quo facto, intra viginti annos eodem sale ita replentur acti cuniculi, ut nullum aliquando eos evacuatos fuisse appareat indicium – DM*, A 28).[18]

The number of people working in the mine was, apparently, quite large. Dimitrie Cantemir mentions 'several hundred men' (*... quotidie plura hominum {centena}*[19] *illis erudendis impendant operam – DM*, A 28 – 'each day, several hundred men toil to excavate them'), which prompted D. Vitcu to assume that Cantemir was referring to all those involved in the production activity (specialised workers, gypsy slaves used for various tasks, convicts).[20]

From Bandini we have more details about the labour pool of the period. It was composed of locals, most being denizens of a village — which at three hundred houses was quite large for its era — located near Trotuș, at the foot of the same mountain where the saltwork was found (*subtus est Pagus trecentas domos complectens – Codex*, 50).[21] The families of this village were exempted from paying taxes (*nec tributum solvunt – Codex*, 50), but were instead required to extract a certain quantity of salt for the Prince. The work assignment was fixed, weekly not daily, and consisted in cutting forty rock boulders (*salis lapides*), which we are told were large, without mentioning a standard size (*una quaevis domus per septimanam, grandes quadraginta lapides pro Principe excidant – Codex*, 50). The work, the only that he was required to perform (*nec aliis occupantur laboribus – Codex*, 50), was carried out by the household head, but it seems that probably in certain circumstances he was allowed to employ somebody to work in his place (*sive Paterfamilias, sive illius operarius conductus – Codex*, 50). The rules concerning the workweek must have been rather lax, since the only concern was to furnish the respective quantity of salt in the mandated timeframe (one week), irrespective of the salt being extracted in one day or in seven (*sive una die, sive tota hebdomade suum numerum compleat – Codex*, 50). It seems that it wasn't a too big problem when the work assignment for a week was not met, only incurring the obligation of completing the backlog in the following week by increasing the number of boulders extracted (*quod si una negligat sequenti septimana octuaginta tenetur et sic caetero – Codex*, 50). Besides these villagers, according to the Catholic missionary, the inhabitants of only two other villages were involved in salt quarrying (*sunt etiam duo alii pagi eodem labore occupati, neq(ue) praeter illos – Codex*, 50),[22] however, they had a different status. They were not exempted from taxes, but work in the mine was not mandatory for them. They were compensated in money (*nec ipsi omnino immunes relinquuntur – Codex*, 50), receiving for each boulder of salt a silver coin or two small Polish silver coins (called in Latin *solidi*): *nam pro singulis lapidibus salis, singuli nummi argentei, seu duo solidi Polonici dantur – Codex*, 50.[23] The workers were also permitted to take each day a certain quantity of salt, as much as a basket would have held (*deinde singulis diebus fragmenta salis quantum quis in canisterio secum potest accipere nemo prohibet – Codex*, 50). A more consistent reward was given at the end of the year, when the custom was that the mine intendants offered each worker one, two or three carts of salt, depending on the latter's social position (*transacto autem anno... iuxta conditionem personarum solet Fodinariis donare unum, duos aut tres currus salis – Codex*, 50). The term *fodinarius* 'digger', 'miner', used here suggests that the specialised workers could have benefited from this 'bonus'. This moment of the year was chosen because it was when the saltmine intendants (Rmn. *cămăraș de ocnă*) were changed. The intendants were boyars vested as general administrators of the mine and tasked with both overseeing the exploitation of salt and its capitalisation; in exchange for their service, the Prince awarded them with a stipend and allowed them to obtain supplemental income from the fine leftover salt of the extraction process.[24] Bandini, in the 17th century, mentions only one intender ('when the indenter is changed' – *Codex*, 50 – *dum Camerarius*

[18] Noteworthy is the observation that sometimes these galleries produce entire fossylised fishes, entombed in salt (*Aliquando etiam in his pisces integri concreti reperiuntur, qui nihilo ab aliis differunt, qui in fluviis vicinis capiuntur – DM*, A 28). *Cf.* Gheorghe Romanescu, *The Perception of Salt Springs in the Romanian Geographic and Geologic Literature,* in *Salt Effect*, edited by M. Alexianu, R.-G. Curcă V. Cotiugă, Archaeopress, British Archaeological Reports International Series 2760, p. 99-109.

[19] According to the critical apparatus of the Latin text from the 2006 edition (elaborated by Dan Slușanschi), it seems that Cantemir himself made a change in the text of manuscript A, adding on the side *centena*, instead of *millia*, which he erased. It is possible he realised that the use of *millia* ('thousands') was an obvious exaggeration.

[20] Dumitru Vitcu, *op. cit.*, p. 35, who argues that the number of specialised workers was not very large (only 225 people). For more on the saltmine workers, also see Dorinel Ichim, *op. cit.*, p. 127.

[21] This rural settlement was at that moment in the middle of an urbanisation process, emerging in the 18th century as the market town of Ocna (Corneliu Stoica, *op. cit.*, p. 17–20).

[22] Dumitru Vitcu (*Exploatarea sării în Moldova*, p. 17) considers that the two villages may have been the later outskirts of Târgu Ocna. It was also argued that they were the villages of Gura Slănicului, Tisești or Viișoara (Corneliu Stoica, *op. cit.*, p. 25).

[23] For more on the privileges afforded by the Prince to the saltworkers, see *ibidem*, p. 23–24.

[24] It is known that the saltmine intenders were allowed to have a supplemental income from the sale of the salt left from the extraction (Dumitru Vitcu, *op. cit.*, p. 15).

mutatur), while Cantemir, several decades later, at the beginning of the 18th century, mentions two, also invested with judiciary power: 'In Ocna, the saltworks are run by two unique intendants. They can both hear cases, but can only solve the easy ones...' – *DM*, A 142 – *Salinis praesunt circa Ocnam duo Camerarii singulares. Hi omnes quidem causas audire possunt, dirimere autem tantum leviores...*. Neither of the two authors provide an exact equivalent for designating in Latin the 'saltmine intendant'. Bandinus uses the basic term *camerarius* ('intendant', 'chamberlain'),[25] while Cantemir finds it convenient to add an adjective to it, *singularis*, with the meaning of 'unique in its kind', 'singular' (*camerarius singularis*, 'singular intendant'), in order to distinguish him from other types of intendants.[26]

The 'chamber/intendantship of saltmines' was founded as an institution even before the first half of the 16th century, the income from the exploitation of salt going into the Prince's coffers.[27] From the second half of the 17th century, when the Prince's private assets (the 'princely chamber', Rmn. *cămara domnească*), which was used by the Prince as he saw fit, was separated from the public, state treasury (Rmn. *vistierie*), controlled by the council boyars, the saltmines represented one of the sources of revenue for the princely chamber.[28] 'For maintaining the Court, they kept the cities and all market towns of Moldavia, alongside twelve nearby villages, the saltmines, taxes, tithes from sheep, from the pigs and hives that the peasants and the nobles of a lower order have' – *DM*, A 144–145 – *Pro suae Aulae sustentatione retinuerunt urbes et oppida Moldaviae cuncta cum duodecim pagis vicinioribus,* salinas*, vectigalia, decimas ovium, suum et alveolarium, quae rustici et inferioris ordinis nobiles possident*. Bandini likewise states that the saltmine workers took out salt *pro Principe* – *Codex*, 50 – 'for the Prince',[29] without any other comment on the income obtained from the saltworks. The income must have been quite large, because, as appraised by Cantemir on the basis of data taken from state records (*e scriniis publicis*), the financial state of the country in the periods preceding him seems to have been robust, with only the Prince earning each year six hundred thousand reichsthalers (*solius certe Principis proventus quotannis sexcenta millia Imperialium superabat* – *DM*, A 145).[30] Through time, however, the historical context left its mark on all the economic branches of the principality. In the second half of the 17th century Moldavia witnessed a major economic crisis that lead to a drastic reduction of income into the treasury of princely chamber.[31] Cantemir states that the latter received each year only one hundred thalers ('But nowadays to such great poverty and unhappiness – ah, what pain! – has Moldavia arrived, that it barely provides the sixth part of the income of once' – *DM*, A 145 – *Hodie autem ad tantam paupertatem et infelicitatem – proh dolor! – devenit Moldavia, ut vix sextam partem pristinorum proventuum praebeat*; 'with less than a hundred thousand imperial thalers', of which ten thousand came from the saltmines' – *DM*, A 146 – *paulo plus centum millibus* {*Imperialium*}.[32] It is difficult to establish if the income from the saltmines during Cantemir's time was indeed smaller than during previous periods, given that Cantemir himself states on another occasion that 'from here a large wealth pours into the treasury of the Prince and of the entire domain' (*maximum ex hoc in aerarium Principis totamque ditionem lucrum redundat* – *DM*, A 28).[33] In any case, the price of

[25] The term *camerarius*, derived from *camera* with the suffix *-arius*, was used in medieval Latin as early as the 6th–7th century, with the meaning of 'person in charge of the king's room', 'valet', 'treasurer' (J. F. Niermeyer, *Mediae Latinitatis Lexicon Minus*, 1976, *s. v.*).

[26] The development of the fiscal apparatus required an increase in the number of intendants, their main role being of administrators and collectors of revenues for the state – P. P. Panaitescu, *Tezaurul domnesc. Contribuție la studiul finanțelor feudale în Țara Românească și Moldova*, in *Studii. Revistă de Istorie,* year XIV, no. 1, 1961, p. 72–73.

[27] Dumitru Vitcu, *op. cit.*, p. 15. *Cf.* Corneliu Stoica, *op. cit.*, p. 16 and 21 (who places the foundation of this institution in the second half of the 15th century).

[28] The exact moment of this separation is not known, but it is known that during the last quarter of the 17th century it had already occurred (P. P. Panaitescu, *op. cit.*, p. 82). For more on the organisation of this financial system, see D. Cantemir: '...for the common use, they have split the revenues, which before were collected in the same place for the needs of the Prince and the necessities of the state' – DM, A 144 – *...communis utilitatis ergo, reditus, qui ante pro Principis commodis, et in reipublicae necessitates in unum colligebantur, diviserunt*. N. Grigoraș (*Instituții feudale din Moldova. I. Organizarea de stat până la mijlocul secolului al XVIII-lea*, București, Editura Academiei R.S.R., 1971, p. 107) observes that after 1631 no internal document mentions the term 'princely treasury', used until then, only 'treasury' is used after that. Also see Valentina and Andrei Eșanu, in the notes to the edition Dimitrie Cantemir, *Descrierea stării de odinioară și de astăzi a Moldovei*, 2007, n. 5, p. 276.

[29] In the period when Bandini made his visit, the revenues from the exploitation of the saltmines flowed, probably, into the coffers of the Prince, who had monopoly over this industry.

[30] Despite this, in the notes of chapter 13 (*Caput XIII. De antiquo et hodierno Moldaviae proventu*) from the 1973 bilingual edition of *Descriptio Moldaviae*, n. 15, p. 268, N. Stoicescu advances the opinion that this sum represented the annual income of the entire country, not only of the ruling prince; in the case of the princely chamber, it is more likely that the revenue was one hundred thousand thalers, the ammount mentioned by Cantemir immediately after. One should also not exclude the possibility that the former prince, now in exile and relying more on memory, was mistaken, referring to the state of the princely treasury in a period before the separation of the princely and state incomes.

[31] Valentina and Andrei Eșanu, in the notes of Chapter 12 (*Despre veniturile vechi și de astăzi ale Moldovei*) of the 2007 edition (n. 13, p. 276–277), considers that among the causes of this crisis is the loss of the impost cities Chilia and Cetatea Albă, increased tribute to the Sublime Porte, and the disadvantageous trade with it.

[32] '... from taxes and customs are collected around thirty thousands, from saltworks ten, from cities and town... fifteen, from the sheep tithe, most often, ten – but in the first year of a rule, when even the boyars are required to pay the tithe, twenty –, from the tithe of hives and of pigs twenty-five, from courtiers and lower-rank nobles fifteen thousand imperial thalers' – *DM*, A 145–146 – *... e vectigalibus et teloniis circiter triginta millia, e salinis decem, ex urbibus et oppidis... quindecim, e decimis ovium, vulgo, decem – primo autem principatus anno, cum Barones quoque decimas solvere tenentur, viginti –, e decimis alveolarum et suum viginti quinque, e 'Curtenis' vel inferioris ordinis nobilibus, quindecim Imperialium millia colliguntur.*

[33] The numbers transmitted by another foreigner interested in the situation in Moldavia, the minorite friar Paolo Bonnicio (1632), are rather similar (15 thousand scudi obtained each year from the exploitation of salt) – *Călători străini despre Țările Române*, vol. V, p. 20.

salt was consistently kept under control by the prince, preventing an excessive exploitation by imposing certain limits: 'There are found in other places such salt deposits, but the princes forbade them being opened, so that, because of the abundance of salt extracted, the price would not fall' – *DM*, A 28 – *In aliis quoque locis multi tales salis meatus inveniuntur, sed hos aperiri prohibuerunt Principes, ne, propter effossi salis copiam, imminueretur ipsius pretium*.

The salt extracted was valorised both on the internal and the external markets. A certain quantity of salt was destined for the internal consumption of the princely court, being managed by the 'great master of the court' (Rmn. *clucer*), the boyar responsible for provisioning and managing the court's food storehouse and the court kitchen when the Prince or necessity demanded ('the great master of the court... supervises all of the Prince's storerooms, in which the fruits, butter, honey, cheese, salt and others of this kind are kept...' – *DM*, A 105 – *Kluczier Magnus... cunctis promptuariis Principis, in quibus fructus, butyrum, mel, caseus, sal, et alia huius generis asservantur prospicit...*).[34]

The Court's income from the exploitation of salt came from the salt tax (Rmn. *solărit)*[35], and from domestic and foreign trade. Both authors highlight the heavy export of salt to various countries, from which Moldavia obtained notable profits.[36] According to Bandini, Moldavian salt reached lands to its east, as far as Anatolia (Russia, Podolia, Ukraine, Turkey, Tartary).[37] Cantemir only mentions the regions to which salt was transported by water (Budjak, Crimea, Trebizond, Sinope, Constantinople, and even more distant lands, such as Northern Africa (Egypt and areas under nominal Turkish rule, generically called *Barbaria*).[38] The salt went down the Prut River up to Galați, an international port in those times, after which it was loaded onto vessels alongside other goods and sent along the Danube and the Black Sea to their destinations.[39] Moldavian salt was, as aptly remarked, shipped and used on three continents.[40]

The attention to details by the two authors marks the most important aspects concerning the valorisation of the salt, its extraction process and the saline reserves of Moldavia, providing extremely useful information for reconstructing one stage of their evolution, and testifying to an understanding of the considerable potential that the exploitation of salt could have had for supporting and stimulating the economy of a country in the early modern era.

Of interest due to their wealth of information concerning the various aspects of public and private life of Moldavia at the turn of the 18th century, the two works were made easily accessible to an elevated European public, transmitted by means of Latin, at that moment still an international language.

References

Călători străini despre Țările Române, vol. V, curated by M. Holban, M. M. Alexandrescu-Dersca Bulgaru and P. Cernovodeanu, București, Editura Științifică, 1973.

Bandini, M., 2006. *Codex. Vizitarea generală a tuturor Bisericilor Catolice de rit roman din Provincia Moldova 1646–1648*, bilingual edition, Latin text established, translated, glossary by T. Diaconescu, historical preliminaries by A. Despinescu, notes and comments by M. Ciubotaru, collation of the Latin text by C. Halichias, critical apparatus for the Latin text and index of names by C. Tărnăuceanu, Iași, Editura Presa Bună, 2006.

Cantemir, C., 1973. *Descriptio antiqui et hodierni status Moldaviae/Descrierea Moldovei*, translation after the Latin original by G. Guțu, introduction by M. Holban, historical commentary by N. Stoicescu, carthographic study by V. Mihăilescu, index by I.

[34] For more on the 'great master of the court', see N. Stoicescu, *Sfatul domnesc și marii dregători din Țara Românească și Moldova (sec. XIV–XVII)*, București, Editura Academiei R. S. R., 1968, p. 287.

[35] The exploitation of surface salt for household use was taxed in Moldavia through the so-called 'salt tax' (Rmn. *solărit* or *sărărit*) (Dumitru Vitcu, *op. cit.*, p. 13). The raising of this tax could have been leased by the Prince, generally to the saltmine (*cf.* N. Grigoraș, *op. cit.*, p. 134). The abuse of the saltmine intendants determined Prince Mihail Racoviță to abolish the salt tax in 1718 (Dumitru Vitcu, *op. cit.*, p. 21).

[36] 'situation from which all the inhabitants of Moldavia acquire a no small earning' – *DM*, A 13 – *qua ex re haud exiguum cunctis Moldaviae incolis nascitur emolumentum*; 'from it a very large earning spills into the treasury of the Prince and of the entire domain' – *DM*, A 28 – *maximum ex hoc in aerarium Principis totamque ditionem lucrum redundat*.

[37] 'Not only Moldavians use salt from this mine, but it is transported to Russia, Podolia, Ukraine, Turkey and Tartary' – *Codex*, 50 – *Ex hac fodina non soli Moldavi sale utuntur, sed in Russiam, Podoliam, Ukrainam, Turciam et Tartariam evehitur.*

[38] 'Besides the inhabitants, those from Budjak and from Crimea, and even those from regions far away, take from this place salt by ships each year' – *DM*, A 28 – *...praeter incolas, Budzakienses et Crymaei, quin et longe dissitae regiones navibus sal, quotannis, inde avehant.*

[39] 'The Danube... nevertheless brings many benefits... They present Moldavians the opportunity to transport their goods, along the Hierasus, towards Constantinople and other cities close to the Black Sea...' – *DM*, A 4 – *Danubius ... commoda tamen quamplurima in hanc regionem confert... Moldavis merces suas per Hierasum Constantinopolim aliasque Ponto adiacentes civitates transferendi*, where the author uses *Hierasus* to designate the river Prut (*cf. Prut, olim Hierasus – DM*, A4). Cantemir further states in a note the goods (among which salt) moved along the Prut and transferred at Galați onto the Danubian vessels: 'and particularly salt, honey, butter, wax, and a great volume of timber...' – *DM*, A4 N – *et praecipue sal, mel, butyrum, ceram et magnam ligneae materiae copiam....* From Galați, they were shipped to various regions, neighbouring the Black Sea or more distant: 'Here / in the port of Galați – AN /, each year, two or three times, dock ships not only from the area neighbouring the Black Sea, Crimea, Trebizond, Sinope, Constantinople, but also from Egypt, and even from Barbaria... and, likewise, they return loaded with honey, salt, butter, saltpetre and grains' – *DM*, A 13 – *Huc quotannis, bis vel ter, non solum e vicinis Ponto locis – Crimaea, Trapezuntio, Sinope, Constantinopoli – sed et ex Aegypto, quin etiam ex Barbaria naves appellunt, lignisque Moldavicis... necnon melle, cera, sale, butyro, nitro et frumento onerata recedunt.*

[40] Dumitru Vitcu, *op. cit.*, p. 18.

Constantinescu, with a note on the edition by D. M. Pippidi, Bucureşti, Editura Academiei R. S. R.

Cantemir, D., 2014. *Descriptio antiqui et hodierni status Moldaviae/Descrierea Moldovei*, second edition, with a Postface by E. Simion, critical reception file by B. Creţu, edited by A.-C. Halichias, Bucureşti, Academia Română, Fundaţia pentru Ştiinţă şi Artă.

Cantemir, D., 2017. *Despre numele Moldovei: în vechime şi azi. Istoria moldo-vlachică. Viaţa lui Constantin Cantemir. Descrierea stării Moldovei: în vechime şi azi*, Latin edition, critical apparatus and indices by F. Nicolae, translation by I. Costa, introductory study by A. Eşanu and V. Eşanu, Bucureşti, Academia Română, Fundaţia Naţională pentru Ştiinţă şi Artă, Muzeul Naţional al Literaturii Române.

Diaconescu, T., 2004. *Elemente de limbă română în manuscrisul latinesc Codex Bandinus (1648)*, in *In memoriam I. Fischer. Omagiul foştilor colegi şi discipoli*, volume coordinated by Lucia Wald and Theodor Georgescu, Humanitas, Bucureşti, p. 131–145.

Eșanu, V. and A. Eșanu, 2007. Introductory study, note on the edition and notes to *Dimitrie Cantemir, Principele Moldovei, Descrierea stării de odinioară și de astăzi a Moldovei*, translation from Latin and indexes by D. Slușanschi, București, Institutul Cultural Român, p. 25–36.

Grigoraș, N., 1971. *Instituții feudale din Moldova. I. Organizarea de stat până la mijlocul secolului al XVIII-lea*, București, Editura Academiei R.S.R., p. 107.

Ichim, D., 2006. *Exploatarea sării în Moldova medievală*, in *Sarea, Timpul și Omul*, edited by Valeriu Cavruc and Andreea Chiricescu, Sfântu Gheorghe, Editura Angustia, p. 125 and 126.

Morère Molinero, N., 2011. *Historical Development of the 'salinae' in Ancient Rome: from Technical Aspects to Political and Socio-Economic Interpretations*, in: *Archaeology and Anthropology of Salt: a Diachronic Approach. Proceedings of the International Colloquium, 1–5 October 2008 'Al. I. Cuza' University (Iași, Romania)*, edited by Marius Alexianu, Olivier Weller, Roxana-Gabriela Curcă, Oxford, Archaeopress, p. 157.

Panaitescu, P. P., 1961. *Tezaurul domnesc. Contribuție l studiul finanțelor feudale în Țara Românească și Moldova*, in *Studii. Revistă de Istorie,* year XIV, no. 1, p. 72–73A.

Papiu-Ilarian, 1872, *Operele principelui Demetriu Cantemiru*, tome I (*Descriptio Moldaviae*), Bucureşti.

Pop, E., 1969. *Dimitrie Cantemir și Academia din Berlin*, in *Studii. Revistă de Istorie*, 5, p. 825–849.

Romanescu, Gh., 2015. *The Perception of Salt Springs in the Romanian Geographic and Geologic Literature,* in *Salt Effect*, edited by M. Alexianu, R.-G. Curcă V. Cotiugă, Archaeopress Bar International Series 2760, p. 99-109.

Slușanschi, D., 2006. *Demetrii Cantemirii, Principis Moldaviae Descriptio antiqui et hodierni status Moldaviae/Descrierea stării de odinioară și de astăzi a Moldovei*, critical edition, București, Institutul Cultural Român.

Stoica, C., 1990. *Evoluția localității Tîrgu Ocna în Evul Mediu (până la mijlocul secolului al XVIII-lea*), in *Carpica*, XXI, p. 8.

Stoica, C., 2006. *Valea Trotușului. Enciclopedie*, Onești, Editura Magic Print, p. 310–314.

Stoicescu, N., 1968. *Sfatul domnesc și marii dregători din Țara Românească și Moldova (sec. XIV–XVII*), București, Editura Academiei R. S. R., p. 287.

Urechia, V. A., 1895. *Codex Bandinus. Memoriu asupra scrierii lui Bandinus de la 1646, urmat de text și însoțit de acte și documente*, Bucureşti, Litografia Carol Göbl.

Vitcu, D., 1974. *Exploatarea sării în Moldova până la 1828*, in *Anuarul Institutului de Istorie și Arheologie 'A. D. Xenopol'*, XI, p. 18.

Vitcu, D., 1987. *Istoria salinelor Moldovei în epoca modernă*, in *Anuarul Institutului de Istorie și Arheologie 'A. D. Xenopol'*, supliment, p. 29.

Werner, B., 1973. *Cantemir și Academia din Berlin*, in *Secolul 20*, 11–12, p. 93–97.