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RÉSUMÉS / ABSTRACTS

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Les sources salées dans le monde rural d'aujourd'hui. Une approche ethnoarchéologique en Moldavie (Roumanie)

Marius-Tiberiu Alexianu
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Les recherches ethnoarchéologiques sur l'exploitation des sources salées dans l'espace précarpatique moldave offrent – semble-t-il – des possibilités uniques en Europe par l'intensification marquée de l'approvisionnement en eau salée après le changement politique et économique de 1989 de la Roumanie. L'opportunité de mener des recherches de ce type dans une zone où on a découvert les plus anciens témoignages d'obtention de sel ignigène en Europe et même au monde (Weller, Dumitroaia, 2005, http://antiquity.ac.uk/ProjGall/weller/index.html), a été saisie au début de la dernière décennie du siècle passé par une équipe roumaine (M. Alexianu, D. Monah, Gh. Dumitroaia). Néanmoins, le véritable développement de ces recherches a débuté en 2003, dans le cadre de plusieurs projets franco-roumains dirigés par O. Weller qui a imposé aux recherches une méthodologie rigoureuse et un remarquable rythme qui ont permis une recherche exhaustive des sources salées du département de Neamţ. A partir de l'automne 2007, ces recherches ont reçu une nouvelle impulsion grâce au projet *Ethnosal* (http://ethnosal.uaic.ro), Projet *Idei*, 414/2007,

financé par le Conseil National de la Recherche Scientifique de l'Enseignement Supérieur (CNCSIS) de Roumanie. Il se propose de poursuivre les investigations dans tous les départements de la Moldavie précarpatique (sauf le Neamţ, les départements de Suceava, Bacău et Vrancea). Les principaux axes de recherches sont :

1. Identification de toutes les sources salées de la Moldavie précarpatique aussi bien à partir des sources documentaires (toponymie, géologie, archives…) que sur le terrain (coordonnées GPS, analyses chimiques, description);
2. Enquêtes ethnographiques complexes (aires d'approvisionnement, transport, utilisations, gibier et chasse, recristallisation, fréquence, commerce et échange, comportements ethnoscience, symbolique du sel) ;
3. Recherches ethnohistoriques (sources littéraires orientales, grecques, latines et médiévales roumaines).

Ţolici, la source salée de Hălăbutoaia

Ces données ethnographiques de première main révèlent parfois une continuité d'exploitation, voir d'utilisation, sur la très longue durée. Ces données sont aujourd'hui en cours d'interprétation et vont permettre d'élaborer un ou plusieurs modèles interprétatifs qui seront confrontés et enrichis par les données ethnohistoriques. Ces modèles interprétatifs et, plus largement, la constitution de ce référentiel diachronique permettra non seulement de mettre à l'épreuve des modèles les données archéologiques autour du sel, mais aussi d'élargir les hypothèses de travail des archéologues d'ici et d'ailleurs pour qui cet objet de recherche a disparu.

Nouvelles investigations ethnoarchéologiques sur les sources salées de Moldavie

Dan Monah
Gheorghe Dumitroaia
Dorin Nicola

Les recherches ethnoarchéologiques des sources salées de la Moldavie ont déjà une certaine tradition. Commencées au XX^{e} siècle, à la fin des années '80, les investigations ont fourni une série d'informations importantes et intéressantes sur l'utilisation actuelle de la saumure des sources salées des Souscarpates de la Moldavie. De nouvelles données ethno-archéologiques pour le nord de la Moldavie ont été obtenues dans le cadre d'un programme roumain – français commencé en 2003. Les auteurs ont entrepris leurs propres enquêtes ethnoarchéologiques dans la partie de nord-ouest de la région des Souscarpates de la Moldavie. On a identifié la source salée de Runc, mentionnée dans un document de l'administration financière autrichienne de la fin du XVIII^{e} siècle. Dans la région de la source salée de Runc on a recueilli une série d'informations intéressantes sur l'utilisation de la saumure, la production de la «husca» et sur les modalités de briqueter le sel.

Une autre zone investiguée par les auteurs se trouve dans la Valea Muntelui, les montagnes de Neamţ, dans la proximité du lac d'accumulation de Bicaz. On y a signalé des sources salées dont la saumure coagule le lait. L'information a été confirmée par une expérience facile suite à laquelle on a obtenu un fromage léger, excellent pour l'alimentation des enfants en bas âge. La saumure de

ces sources a été analysée dans les laboratoires de l'institut « Petru Poni » de Iaşi. Les auteurs ont l'intention de continuer les recherches dans d'autres régions de la Moldavie et même de la Valachie et de la Transylvanie.

Fig. 1. La source salée „La Ionel" de Fărcaşa, dép de Neamţ.

Fig. 2. Fromage obtenu par la coagulation du lait à l'aide de la saumure.

Ancient Methods for Salt Exploitation in Buzău Area in the XXIth Century

Doina Ciobanu

The ancient methods used for salt exploitation in the south-eastern area of the Carpathian Mountains are also available. This primitive kind of exploitation represents the oldest form of exploitation in the region, even older than the royal exploitation, so it can be dated before the constitution of the Middle Age states, when all the benefits were collected by the rural communities. Salt exploitation became a royal privilege and, later, it became a vestige from an ancient age.

Information about primitive salt exploitation were found in the second half of the XVIIth century, but all written sources prove an earlier reality. The privilege of salt exploitation was related to the inhabitants of the Buzău, Saac and Râmnicu Sărat county (actually the northern part of the Buzău and Vrancea counties). The people in that region had the right to exploit the salt deposits only for their personal purposes but they were imposed to pay a particular tax called "sărărit". Sometimes, this tax was a reason for trials and punishment rules.

Ancient methods of salt exploitation are used currently in Bisoca-Sări where there is a pit with galleries. The tools used now are not very different from the Dacian tools, except for the electric light.

This work is based on real data from such an ancient form of salt exploitation in the XXIth century.

El Salado-Ixtahuehue y Benito Juárez-Soconusco: An Ethno-Archaeologic Study about the Salt Pre-industries of Innerland

Jorge Alejandro Ceja Acosta

Up to the present there have been several investigations to understand how different groups in the past took advantage of the salt (Andrews 1993, McKillop 2002, Parsons 2001, Williams 2003). However many of them have put emphasis only on the technical part of the getting process, and it is necessary to take into account new directions to understand the relationships, the technology, the social practices and the agents involved.

An ethno-archaeological observation and the recuperation of oral history in two salt pre-industries (Ceja Acosta 2007a) allow me to notice that the getting of pre-Hispanic salt could be more complex. The social practice in these two examples set us on alert, because the technology was linked to relations of gender, constructions about space and perceptions of the world.

At the same time the ethnographic data obtained in these regions led me to the announcement of the hypothesis in the archaeological register; that is, I don't know yet if the getting in the salt industries was accomplished by domestic groups or controlled by elite groups, and if this practice was carried on by men, women or if there was mixed participation. So it is necessary to understand the relationships of saltmakers, there in the context where daily actions were developed, the salt pre-industries.

The Salt Industries of Soconusco and Benito Juárez. An Archaeologist Dates Interpretation from the View of Gender and Identity

María Luisa Martell Contreras

The role that the women had in the process of getting the salt in the communities of Benito Juárez and Soconusco, Veracruz was a unique and fundamental element within an activity which developed from the pre-Hispanic age until our days – in spite of the modifications that this activity has suffered by external elements to the group in this case.

The support in ethnographic data was gathered in the investigation project "EOS" (Strategies of Getting Salt) during the year 2006; it has allowed us to observe a part of the social relationships established between the salt pre-industries and the rest of the participants (men, children, and the rest of the community). In this context, we can say that they established hierarchic levels in the salt context, according to the age, the experience and the perception of group related to the role performance of each one in the salt pre-industries. In this way of their members and the integration of new members interacted; relationships are based on social constructions that are materialized in a group of activities, ideas, speeches, and representations specific to the gender of the determined behavior function.

This work is a short interpretation of the social-cultural relationships which were established in the salt context and out of it, based on gender and identity.

Tell Provadia-Solnitsata: Prähistorische Salzgewinnungszentrum

Vassil Nikolov

Die Grabungsergebnisse der spätneolithischen Schicht von Tell Provadia-Solnitsata in der Zeit 2005 – 2007 haben die Anwendung zum ersten Mal in vorgeschichtlicher Europa einer neuer Salzgewinnungs-technik gezeigt. Die Prinzipien dieser Technik bleiben gültig bei der Salzgewinnung auf unserem Kontinent auch während einiger nächsten Jahrtausende. Es geht um das Auskochen von der Salzlake in tiefen und dünnwändigen, speziell ausgearbeiteten keramischen Schüsseln. Die Gefässe mit der Salzlake wurden in grossen zum Ziel gebauten Öfen aufgestellt. Das daraus gewonnene reine Salz wurde als Wechselmittel ausgenutzt. Da das Salz der einzige strategische Rohstoff im Neolithikum war, und gemeinsam mit dem Kupfer als solchen auch im Chalkolithikum blieb, so wurde die Salzgewinnung zu einer Quelle von Möglichkeiten für soziale Prestige – einzelner Menschen, Familien, der Siedlung. Höchstwahrscheinlich ist die Salzgewinnung bei Provadia eine Voraussetzung auch für das Anhäufen einer ausserordentlicher Menge Prestigegegenstände von der Gemeinschaft im Gebiet von Varnasee, ein Teil welcher in den symbolischen und realen Gräbern der spätchalkolithischen Varna-Nekropole gelangen sind.

Late Neolithic Pottery for Salt Production in Tell Provadia – Solnitsata

Polina Stoyanova

The salt production pottery is specific ceramics which have been uncovered for the first time in Europe. They belong to the late Neolithic layer of settlement mound Provadia – Solnitsata where the rest of the pottery is characteristic to the culture Karanovo III-IV (5400 BC) in Thrace. The vessels for salt production are big and deep bowls used for brine boiling. Their thin walls (from 3-4 to 5-6 mm) and their high porosity resulting from the burning of a great quantity of organic admixtures added to the clay facilitated the brine evaporation. But that is why the bowls are mostly discovered in a fragmented condition. The graphic reconstructions of the larger mouth fragments from the late Neolithic building 5 showed that the capacity of the vessels for salt production up to the level of the maximum diameter (to which the bowls were probably filled) was from 5.5 to 35.5 l.

The analysis (chemical and physical) made on part of the fragments gave additional information on the technology of the earliest salt extraction in Europe. Apparently, during the evaporation, the potassium and magnesium chlorides (they are always present in the brine and impart to it a bitter taste) were soaked in the porous walls – thus filtering the brine.

The salt production vessels shaped up the ready product itself which makes them the earliest moulds discovered until now.

Le centre de saunage Provadia – Solnitsata durant le Chalcolithique

Viktoria Petrova

La production et l'utilisation du sel dans le centre de saunage Provadia-Solnitsata s'est probablement poursuivi durant la culture du Chalcolithique moyen Hamangia IV.

Les dimensions de la maison à deux étages qui a été étudiée, sa grande surface de plus de 120 mètres carrés, son architecture de pierres et la richesse de son complexe céramique marquent la richesse, qui est probablement liée à la production et au commerce du sel. Les vases céramiques, décorées avec un décor de stamps, cannelures et de peinture rouge trouvent ses parallèles dans l'horizon VII du tell Durankulak de la culture Hamangia IV et dans la culture Precucuteni III. Les formes spécifiques de vases n'ont pas d'analogues dans les cultures contemporaines et supposent une fonction plus spécifique, qui a été probablement liée à la production du sel.

Salt Deposits from the Molasse of Eastern Carpathians (Romania): A Guide for Archaeological Studies

Iulian Boboş

Geological background: The Lower Salt Formation (The Lower Miocene) in the Molasses of Eastern Carpathians is well developed in the diaper folds zone and in the Moldavian Sub-Carpathians (Fig. 1). Besides pelitic, sandstones, marls, conglomerates and breccias rocks, the main evaporitic rocks comprise chlorides (halite and sylvite) and sulfates (gypsum and anhydrite). The lower salt formation occurs as interbeded or brecciated rocks containing salts. This is why the lower salt formation is known also in the local literature as "salt breccias". Along the Almas anticline (from Cuejdiu to Cracaoani), salt and clay breccias occur in the bottom, whereas a sequence constituted of black clays and green and gray sandstones occur in the upper part of the Lower Salt Formation. There are also several occurrences of H_2S or mixed alkali-chloride waters (hypotonic and isotonic waters) around the Bălătesti district used nowadays in geomedicine.

The genesis of salt deposits: The oil genesis is described as a process in which a salt diaper is dissolved by surface water forming a brackish lake with the salt mirror of the salt diaper as the bottom. During the dissolution of the salt mirror, algae (*i.e.,* Dunaliella *sp.*) and other organisms, live and die, near the surface of the brackish lake. They sink as debris to the bottom of the lake where they are decomposed by anaerobic microbes to soluble organic

compounds and H_2S originating from the gypsum in the diaper. The resulting solution sinks along the flanks of the diaper to great depths, where the organic compounds are decarboxylated and hydrogenated by geothermal heat, and with the help of H_2S (Fig. 2).

Historical implications: Salt is physiologically absolutely necessary for human life, where in the past prior to the pre-industrial society the known mineral salt sources were so much limited and its supply was a critical demographic power factor for most communities. It was only available as visible and exposed rock outcrops in arid regions, or as dried out salt cake on the shores of some seas and salt lakes. In areas with wet climate, the protruding salt dissolved making it almost impossible to discover. It is probably for that, more than for any other reason, that many of the great civilizations first developed near deserts and desert climates, for example the Mediterranean region, at the edges of the "arid" zones. By contrast, the main salt sources in the Eastern part of Romania were related with the salt deposit from Slănic Moldova, Cacica and the salt waters from the Băltătesti area.

Săndulescu, M. (1994) Overview on Romanian geology. ALCAPA II, Field Guidebook, 3-15 pg.

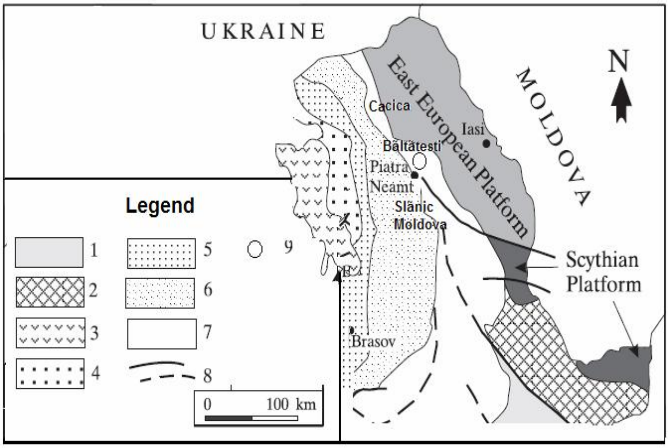


Fig. 1. Geological map of the Eastern part of Romania (Săndulescu, 1994). 1 - Moesian Platform; 2 - North Dobrogea orogen; 3 - Neogene volcanic arc; 4 - Median Dacide units; 5 - External Dacide units; 6 - Moldavide Nappe Complex; 7 - Neogene Molasse; 8 - Faults, 9 - Location of the area with salt waters and salt deposits.

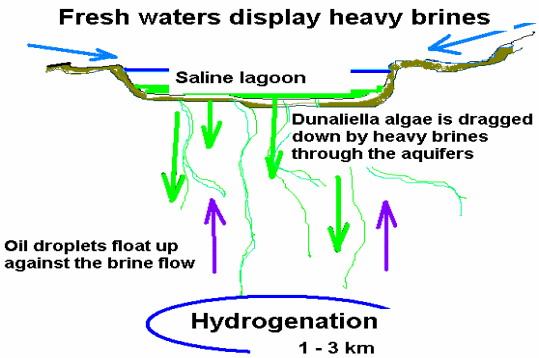


Fig. 2. Idealization of the salt diaper dissolved by surface waters and the saline lagoon formation.

L'Approvisionnement en sel des tribus Cucuteni et Tripolye

Dan Monah

Dans le contexte des importants progrès de l'archéologie du sel en Roumanie, on a enregistré ces dernières années un certain intérêt pour le problème de l'approvisionnement avec sel des tribus Cucuteni et Tripolye. Les premiers chercheurs qui se sont occupés de cette problématique ont été John Chapman et Bisserka Gaydarska, qui distinguent trois potentielles zones d'approvisionnement : (1) la côte de la mer Noire et la presqu'île de Crimée; (2) les Régions de l'Est (le bassin de la Volga et l'ouest de la Géorgie) et (3) les Carpates Orientales. Indépendamment des chercheurs britanniques, Magda Mircea a proposé une nouvelle traduction et interprétation du célèbre passage d'Hérodote sur les montagnes de sel de l'embouchure du Dniepr. Pour appuyer sa proposition de traduction et d'interprétation, la chercheuse de Iasi cite de nombreuses informations d'époque moderne concernant l'exploitation du sel marin sur le littoral de nord-ouest de la mer Noire. Récemment, Magda Mircea et Marius Alexianu ont proposé une intéressante réévaluation des ressources de sel des cultures Cucuteni et Tripolye.

L'auteur se propose d'analyser aussi finement que possible les hypothèses et l'argumentation formulées par les chercheurs mentionnés et, en s'appuyant sur les nouvelles découvertes archéologiques, il essayera de préciser quelles pouvaient être les zones d'approvisionnement avec sel des communautés Cucuteni et Tripolye.

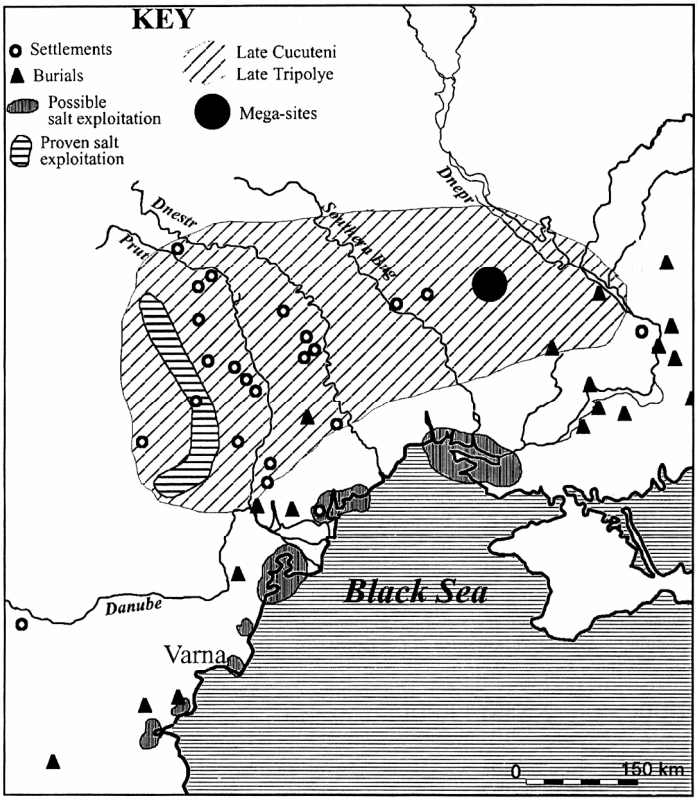


Fig. 1. La carte des potentielles sources de sel pour les habitats géants de Tripolye (d'après J. Chapman, B. Gaydarska).

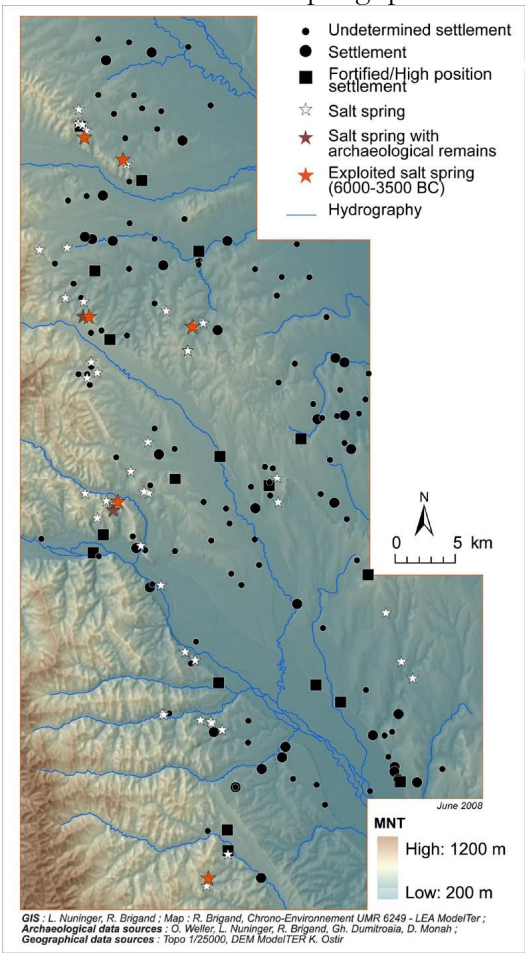
Spatial Approach of Prehistorical Salt Exploitation in the Eastern Carpathians (Romania)

Olivier Weller
Robin Brigand
Laure Nuninger
Gheorghe Dumitroaia

This French-Romanian project, established at the end of 2003, aims to study the dynamics and interactions between human settlements and occurrence of salt springs. The Oriental Carpathian mountains, in Moldavia, offer a perfect research site for studying the continued exploitations of salt springs from Neolithic times to the current day. This paper focuses on the nature of prehistoric occupation – from Neolithic to Chalcolithic (6000-3500 BC) – in the Neamț department.

In order to understand the impact of salt resources, on the human organization, our approach includes social (archaeology and ethnology) and natural scientific perspectives (geoarchaeology, palynology and anthraxcology). Using a Geographical Information System, this project aims to analyze the relationship over the long period between settlement patterns and salt springs distribution. Our GIS includes different layers: an archaeological database (241 sites and 79 springs which 58 are salty) mainly based on fieldwork records (GPS measurements), a digital elevation model with a 25 m resolution made from satellite imagery by K. Ostir (IASS, ZRC SAZU, Slovenia) and the administrative district map at the level of the village (M. Consinschi, University of Lausanne).

Using mapping and kernel density estimation, such data enabled the analysis of the relationship between settlement density dynamics and salt springs distribution. In addition, a qualitative approach is in progress in order to determine which kind of salt control is exercised. This approach includes a landscape analysis, using a view, from archaeological sites and from the salt springs points of view.



In the chronological framework of the Cucuteni culture (4600-3500 BC), this analysis will provide a primary hierarchy in terms of control of salt resources. Before this period, the Neolithic settlement networks showed the main background tendencies which ensured the Chalcolithic demographic development. Later, this analysis may be used to explain the powerful link between hierarchical human settlements and salt springs.

Exploiting Salt Water in Moldavia during Prehistory: Local People or Foreigners?

Roxana Munteanu
Daniel Garvăn

Field researches were carried out during the last decades in some of the archaeological deposits identified next to the salt springs from the piedmont region of Moldavia. We took into account the systematic researches from Solca – *Slatina Mare*, Cacica – mină, Lunca – *Poiana Slatinii*, Ţolici – *Hălăbutoaia* and Cucuieţi – *Slatina Veche*. In each of those sites several layers were identified. The present contribution in that respect reports on the human presence near the salt spring during the Chalcolithic and the Bronze Age. Apart from the great amount of "local pottery" the respective archaeological layers comprise several shreds of a different type.

Such artefacts were discovered in the Cucuteni A layers from Ţolici, the Cucuteni B layers from Cacica, Solca, Lunca and Ţolici and in the Bronze Age layers from Lunca and Cucuieţi.

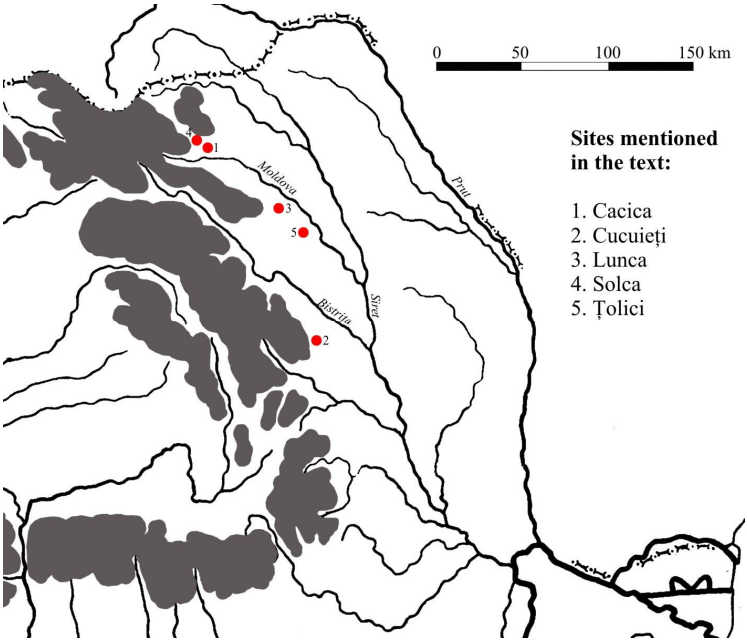
A review of some methods of crystallising salt is also presented. Correlating these data with the archaeological contexts, some question emerged:

- To what extent do the archaeological realities reflect the human behaviour?

- Which is the "right conclusion" in regard to the presence of foreign pottery near the salt springs?

The origin and the spatial distribution of the "foreign materials" were examined. The authors initiate a

discussion about the above mentioned issues, seeking for an appropriate explanation.



Salt in the South and Western Transylvania in Prehistory

Gheorghe Lazarovici
Cornelia-Magda Lazarovici

Salt has been playing important role in the evolution of society, because of its being an indispensable nourishment for man and animals. Additionally, salt has also a therapeutic role, being used for this purpose by traditionalist societies, but even today. In that respect it plays an important role as well.

The Neolithization process started with animal breading (sheep/goats, cows) and garden agriculture. The oldest Neolithic sites in the Intra-Carpathian area (Gura Baciului, Ocna Sibiului) or in the Extra-Carpathian one (Govora – *Valea Răii*/Copăcele, Lunca – *Poiana Slatinii*) are related with salt springs / lakes, currently salt bathes (Miercurea Sibiului, Ocna Sibiului, Cojocna), areas with salt, areas with previous salt springs. Some disappeared today but are present in the local toponymy, such as Şeuşa (Early Neolithic), Bădeni (Bronze Age, Hallstatt (*So* = salt or *sosviz* = salt water: Hungarian language).

In our opinion not only the salt itself is important to be studied, but the roads to the salt areas are also important to be studied and understood.

We intent to present some case studies that may be more important as a general presentation. These are related to our older or newer special research in regard to the salt sources.

In the paper we present some archaeological areas

located in the vicinity of salt sources such as: Tureni, Buneşti, Cojocna - Căian Vamă etc.

Some other examples, situations or ethno-archaeological researches related to salt area also presented: use, transportation, its role in historical processes (especially the Neolithization).

The salt, obtained from different sources (sea, lakes, salt springs, salt mines) because of its qualities and taste determine terms of comparison or mythological elements that benefit of a large symbolism. Many proverbs or sayings express elements that draw our attention: *...beloved as salt in the food, evil as salt in the eyes...* or *to put salt on the wound...* etc.

New Evidence for Bronze Age Saltworking in Transylvania

Anthony F. Harding
Valeriu Cavruc

Although Transylvania is one of the richest parts of Europe in natural deposits of salt, until recently little was known about prehistoric saltworking in this area, as compared with other European salt-rich areas, Moldavia, Poland, Austria, Germany, France, Spain and Great Britain. The only known archaeological evidence for prehistoric saltworking were the wooden objects found in *Valea Florilor* near Turda and *Băile Figa* near Beclean, discovered without relevant archaeological context. These findings were presented in the archaeological literature as belonging to the second part of the Early Iron Age. Recently V. Wollmann and H. Ciugudean published the results of the C14 dating of the wooden trough from *Valea Florilor*. The date falls between 1430 and 1010 cal BC (95% probability).

Starting with 2002 the authors of this study began field research in eastern Transylvania with the aim of developing our knowledge of prehistoric saltworking. As a result, the number of discoveries grew and new data concerning prehistoric technology of saltworking was obtained. The newly discovered evidence reveals both saltmining and brine evaporation methods of salt extraction. The saltmining was attested in the sites *Băile Figa*, *Sasarm* and *Caila* (Bistriţa-Năsăud County) while the evaporation method is attested by the evidence coming from southeastern Transylvania, *Olteni* and *Zoltan* (Covasna County).

• *Băile Figa* (Beclean town). This site was discovered by the geologist dr. Ioan Chintăuan from the Complexul Muzeal Judeţean Bistriţa-Năsăud in 1977. In 1986 I. Chintăuan and I. Rusu published the brief information about the site. Basing on the similarity of the wooden trough from this site to that from *Valea Florilor*, they dated it to the second part of the Early Iron Age. In 2005 I. Chintăuan extracted the trough (without appropriate recording) and transported it to Bistriţa museum. Soon after, we visited the site and with kind permission of I. Chintăuan took two samples from the trough. These produced radiocarbon dates which give a combined date of 1090-970 cal BC (88% probability). In 2006 we carried out a systematic survey in the site. We processed the topographical map of the site and established that the archaeological evidence within it cover the area of about 600 x 300 m. The site is placed above the huge deposit of rock salt 1.5 – 4 m from the terrain surface. There were three main kinds of evidence: about 500 timbers visible in the valley of the Pârâul Sărat stream (salty stream); many cavities and mounds of earth resulted from diggings made in different times for salt extraction; small areas with Bronze Age and post-medieval pottery on the surface, as well as several isolated artifacts: stone mining tools, wooden pegs etc. We also collected in 2006 new samples of timbers for C14 dating and submitted them to the Groningen laboratory. Of these, four fall around 1000 cal BC, one around 250 cal BC and one around 450 cal AD.

In 2007 and 2008 we carried out archaeological excavations in the site. We opened 15 trenches in all parts of the site. The most important results were obtained in trench I (near the spring of the Pârâul Sărat stream), in trench XV about 200 m downstream from the trench I in the place

were I. Chintăuan discovered the trough, and trench III 500 m north of trench I at the northern end of the site.

In trench I we found the evidence of saltworking from two periods. The earliest one was presented by some disturbed wooden structures, two wooden troughs, Bronze Age pottery, some wooden tools (small shovels, a hammer, and a ladder), and stone mining tools. The best analogies for these findings come from Valea Regilor (Ukrainian Maramureş) and Valea Florilor. It seems that the earliest evidence dates from the Late Bronze Age. The more recent evidence consists of the rectangular (about 3 x 3 m) construction made of horizontally placed timbers which seems to be the top of a mine shaft. This construction cut through earlier structures. To the same period belongs probably the post-medieval pottery found in the upper level of the trench I. At the time of writing (August 2008), we are awaiting the results of C14 analyses on a series of further samples which will confirm or modify our hypotheses.

Trench XV revealed some vertically placed timbers, a trough and a ladder. The artifacts found in this trench include a fragment of a stone mining tool and a perforated wooden "hook" with small piece of wood introduced in its hole.

Trench III revealed a cluster of wattle, pole and plank fences which cover the area of about 30 x 30 meters. From east and north-east this cluster is limited by an arch-shaped wattle fence. One of the wooden structures placed in the central part of the cluster was figure of 8-shaped, its walls made of poles and wattle, while its roof was made of massive timbers and wattle. The artifacts found in this trench include some stone mining tools, several wooden objects: a socketed axe handle, pegs from troughs of the type we found in trench XV, shovels, different "hook"-

shaped objects, and a fragment of perforated disc. We also found in the trench III and next to it the Early Bronze Age pottery (of the Iernut – Zoltan – Silea – Orlești type).

• *Sasarm.* We discovered this site in 2005 and surveyed it in 2006. This site covers the valley of the Valea Sărată (salty valley) stream. Along this stream on the length of about 800 m various timber structures and isolated timbers are visible. Some of them definitely come from mining galleries. Most of them seem to be of post-medieval period. At the same time, on the left bank of the stream, against the brine well we found a small area with Early Bronze Age and Iron Age pottery, what suggest that people exploited salt also in that periods.

• *Caila.* We discovered this site in 2007 and in 2008 undertook a rapid sketch survey of it. It looks similar with that from Băile Figa. Many timber structures are visible on the surface, at the length of about 300 m, along the stream with salty water. In its central part, in the left bank of the stream, was a trough similar to those from Băile Figa was found. A few Bronze Age sherds were found also in this site.

As to the evaporation method of obtaining salt, we mention the possible evidence from two Late Bronze Age (Noua culture) settlements in southeastern Transylvania: *Olteni* and *Zoltan.*

• *Olteni* (Bodoc commune). This settlement was excavated in the period between 2002 and 2006. The settlement is situated not far from the spring of salty water. In some of the storage pits discovered in the settlement, the fragments of massive clay containers were found.

• *Zoltan* (Ghidfalău commune). This settlement was researched between 1996 and 2002. At the bottom of the massive deposit of ash ("zolnik") a few fragments of a massive clay container were found.

Both Olteni and Zoltan containers are very similar with those from some Coslogeni culture (Late Bronze Age) settlements, situated in the area with salt springs. We have no real proofs that these containers were used for evaporation of salt. But the fact that all sites in which such containers were found are situated in the salt-poor area near the salt springs seems highly suggestive. Moreover, these containers have good analogies in Britain in post-Roman sites with certain evidence of evaporation of salt water.

The First Exploitation of Salt in Spain: Thinking about the Salt Used in the Iberian Peninsula during the Prehistory

Jesús Jiménez Guijarro

In this paper, we try to point out the real evidences of salt exploitation in the Iberian Peninsula, especially during the Neolithic. We make a complex review of evidences, we take into account the dates and the real context and the existence of clear remains of salt exploitation in this region of South-western Europe.

Therefore, today, the investigation of this matter is based only on circumstantial and poor evidence. A lot of archaeological sites that we suppose are connected to the salt exploitation, really have very poor remains or are bad or incompletely investigated too.

We explained in other works our disappointed about the real exploitation of salt during the Neolithic times. We explained the difference between concepts like exploitation and use, and we are confident about use of salt, but not about complex salt exploitation, during Neolithic times.

We point out that a lot of evidences presented like clear remains of salt mining during the Ancient and Middle Neolithic are really only circumstantial evidence of the advantage taken over by the rich ecological niches. Thus, the high profile sites occupied by Neolithic farmers, and especially shepherds, are related with salt areas but, we think, they are not related with early salt exploitation.

Normally, these 'neolithic' sites, are certainly broad

occupation areas where Chalcolithic and Bronze Age evidence are the most common archaeological evidence. This matter proved critical to our investigation, because we needed to know what evidences are directly linked with the salt exploitation.

We have a new archaeological issue and we need to approach it from a different point of view. Certainly, we need new archaeological sites and new field investigations too with unmistakable evidences of salt exploitation and not only some related to salt use.

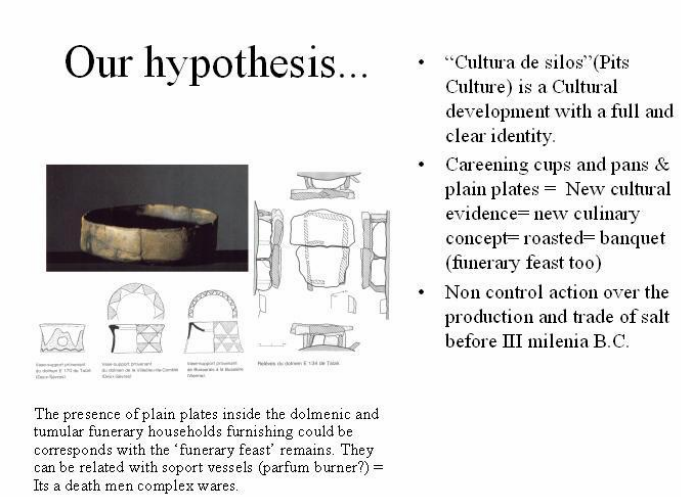


Fig. 1. Explanation of our work hypothesis.

Le sel dans l'Antiquité: essai de quantification

Bernard Moinier

Les statistiques manquent pour rendre plus gratifiant le traitement des informations sur le sel dans l'Antiquité, telles qu'on peut les compiler et les comparer grâce à la littérature, à l'archéologie et à l'épigraphie. Il paraît donc important de rechercher ce que pourraient avoir été, en volume, l'offre compte tenu des sites identifiés (l'apport des marais salants de la région d'Ostie a été très exagéré) et la demande en s'attachant aux débouchés essentiels (utilisation culinaire du sel alimentaire, salaisons et alimentation animale).

Deux approches méritent d'être retenues pour entreprendre des calculs dans ce but. L'une consiste à partir des statistiques démographiques disponibles (cens, estimations). L'autre procède d'une analyse des « ingesta sodés » (sel effectivement ingéré), lesquels sont connus chez l'animal et chez l'homme. Il n'est pas inutile de disposer d'un ordre de grandeur faute duquel l'information est flottante. Par exemple, à la fin du règne d'Auguste (14 PC), l'Italie aurait eu des besoins en sel de quelque 50.000 t/an pour une population d'environ 7,5 millions d'habitants. Le regard jeté sur les marais salants en devient plus critique.

Il s'agit là de consommation apparente. Selon que la production excède ou non la demande, il y a lieu, dans un cas, de stocker ou d'exporter, dans l'autre, d'importer du sel. Il semble que les Anciens, quand l'économie salinière a changé d'échelle, aient préféré ajuster la production aux

besoins régionaux et plutôt exporter des salaisons et du *garum* à forte valeur ajoutée. Avec quelques statistiques, la réflexion sur le commerce extérieur n'y gagnera-t-elle pas en pertinence ?

La consommation du sel dans le monde grec et romain

Cristina Carusi

La seule donnée quantitative relative à la consommation alimentaire du sel dans le monde gréco-romain provient du traité *De agricultura* de Caton le Censeur: il s'agit de la ration assignée aux esclaves employés pour les travaux agricoles, estimée en 1 *modius* par an *pro capite* (=*ca.* 8,7 l). Comme cette donnée peut paraître un peu trop élevée, il faut l'apprécier dans le contexte du régime alimentaire ancien et en particulier dans le cadre de l'optimisation des ressources à l'intérieur d'un domaine agricole.

Vu qu'elle peut être représentative de la consommation moyenne individuelle dans le monde ancien, on peut l'utiliser pour évaluer les besoins en sel d'une *polis* grecque donnée, dont on peut restituer a peu près le numéro des habitants. Cette évaluation ne sera valable que pour les besoins alimentaires, car à l'heure actuelle il est impossible de calculer la consommation relative à l'élevage ou aux activités artisanales à l'intérieur d'une communauté ancienne. Dans le cas des *poleis* où on ne pratiquait pas des métiers faisant usage du sel en grande quantité (*e.g.* Athènes), l'évaluation des besoins sera très proche de la demande totale de sel de la communauté.

Comme les données quantitatives relatives à la production des mines ou des marais salants anciens restent inconnues, on ne peut pas utiliser les évaluations des besoins pour dire si la demande de chaque *polis* pouvait être satisfaite par ses propres ressources. Par contre on pourra

considérer le potentiel productif des usines à salaison mises au jour dans plusieurs sites de la Méditerranée pour comparer la demande d'une communauté particulière à celle d'un établissement industriel.

On verra que dans le premier cas la demande ne devait pas être trop élevée, tandis que dans le second elle pouvait atteindre des niveaux considérables. Si les grandes usines à salaison devaient s'appuyer sur des exploitations intensives du sel, dans les autres cas le milieu naturel de la Méditerranée pouvait assurer presque partout la formation du sel nécessaire pour l'approvisionnement de base des petites et moyennes communautés.

Le sel dans l'expression sapientiale grecque et latine

Mihaela Paraschiv

Le proverbe (ἡ παροιμία) et la sentence (ἡ γνώμη) ont été identifiés par Aristote comme des formes de l'expression sapientiale ayant une valeur à la fois éthique et esthétique (*Rhetorica*, II, 21 1394a-1395b; III, 11, 1413a). Il les définit sans en entreprendre une délimitation par catégories, comme ses successeurs du milieu péripatétique le feront en établissant l'appartenance du proverbe à un patrimoine populaire, commun et anonyme, mais en revendiquant, en ce qui concerne la sentence, une paternité auctoriale. La récurrence de certains proverbes dans les ouvrages aristotéliciens certifie l'opinion du stagirite relativement à la valeur de philosophème que le proverbe possède et rend possible l'hypothèse selon laquelle il serait lui-même l'auteur d'un recueil parémiologique (Περὶ παροιμιῶν). C'est aussi à l'expression sous forme de maximes (ἡ γνωμολογία) qu'Aristote a accordé une attention particulière, en statuant l'exigence de la congruence entre le statut de l'émetteur (une personne âgée, avec expérience – πρέσβυς, ἔμπειρος) et son message gnomique. Selon Aristote (*Rhetorica ad Alexandrum*, IV, 17, 24), ce qui fait que les deux formes d'expression sapientiale soient éthiques, c'est le fait qu'elles ont comme sujet l'homme et qu'elles fassent référence à des actions pratiques de la vie et à des objets à utilité humaine; il s'agit donc du transfert, sur le plan conceptuel et axiologique, vers une expression figurée, de l'expérience pratique d'une collectivité humaine.

C'est à partir de ces prémisses théorétiques que l'on essaie dans cette dissertation de suivre la manière dont un élément indispensable à la vie humaine, comme le sel (ὁ ἅλς, -ός; τὸ ἅλας, -ατος; lat. *sal*, *-is*), a été impliqué dans le passage noétique et expressif du concret à l'abstrait, en incorporant dans l'ancien grec et dans le latin, les vertus axiologiques propres à la réflexion populaire et cultivée. Comme preuve de ce parcours du sel du plan matériel vers celui spirituel on a le témoignage de Pline l'Ancien: <*sal*> *adeo necessarium elementum est, ut transierit intellectus ad voluptates animi quoque. Nam ita sales appellantur, omnisque vitae lepos et summa hilaritas laborumque requies non alio magis vocabulo constat* (*Naturalis historia*, XXXI, 88).

Analyse de l´évolution historique des salines: des aspects techniques aux enjeux socioéconomiques et politiques

Nuria Morère Molinero

On se propose dans cette intervention d´analyser le sens et le rôle des centres producteurs de sel, les salines. Ils seront abordés d´un point de vue technique, aspect indispensable historiquement dès l´Antiquité, mais ils acquièrent aussi une autre interprétation économique, sociale et politique qu´on tient à souligner. Ainsi, partant des antécédents préhistoriques, on s´arrêtera sur l´Antiquité où semble s´être constituées ces installations d´après la documentation disponible, mais aussi sur des contextes historiques ultérieurs, intéressants en eux-mêmes mais aussi d´un point de vue comparatif, qui nous aideront à comprendre certaines données de l´Antiquité. En ce sens, bien que tout le Bassin méditerranéen soit concerné, la Péninsule Ibérique est un territoire prioritaire vers lequel nous porteront davantage nos analyses.

Les sels dans les travaux de lessive et de teinturerie à l'époque antique

Virginie Delrue

Après une étude sur l'usage du natron dans la pharmacopée, il nous a semblé opportun d'analyser le traitement réservé aux sels dans d'autres utilisations.

L'usage des sels est déjà bien connu dans plusieurs domaines aussi variés que la momification, la médecine, la verrerie, ou encore la faïencerie et la cuisine.

Dans le cadre de cette communication, nous concentrerons notre étude sur des domaines moins documentés, à savoir l'utilisation du sel commun et du natron dans la teinturerie et la lessive.

Nous verrons, dans ces différentes utilisations, quel produit, sel, natron ou alun, est utilisé et pourquoi. Est-ce le plus proche, le plus disponible qui est privilégié ? Le moins cher ? Ou cherche-t-on au contraire la qualité ou la spécificité d'un produit unique comme c'est le cas dans la pharmacopée ? L'objectif de cette communication est de démontrer que le choix du produit n'est pas anodin et qu'il dépend de plusieurs facteurs, le premier d'entre eux étant la recherche de la meilleure efficacité et du meilleur produit.

Cette étude réunira les témoignages littéraires, les papyrus et les fresques qui font allusion à ces industries de l'antiquité, de l'époque pharaonique jusqu'à la période romaine, ce qui mettra en évidence la faible mouvance des techniques industrielles et la pérennité de ces produits.

Figure 1.12 Men Washing from the Tomb of Ipuy. A photograph of a wall painting showing men washing cloth from the tomb of Ipuy at Deir el-Medina, dated to the Nineteenth Dynasty, 1293-1186 BC. The photograph is by Andri Held, Lausanne (Boulanger, 1965, p.72).

Détail d'une peinture de la tombe de Ipouy à Deir el-Medineh (Nouvel Empire)

'Salty' Place-names in European Antiquity

Alexander Falileyev

It is well known that quite a few place – and river – names of ancient Europe go back to various reflexes of a Common Indo-European word for 'salt' in certain languages. In this paper I am going to discuss a set of 'salty' geographical names reflected in several linguistic traditions of ancient Europe, paying attention to the extensions found in the corresponding derivations (cf. recent work of Z. Babik on Slavic and Baltic). It should be borne in mind, that in certain cases the meaning of the names is rather 'dirty'/'sedimented'. Therefore, attention to semantic transformations is to be paid. In the second part of the paper I will draw attention to a range of geographical names traced back to the etymon by folk etymology, sometimes even against the rules of historical phonetics. I am also going to discuss a number of 'salty' place-names with unclear linguistic attributions.

Etymological and Historical Implications of Romanian Place-names referring to Salt

Adrian Poruciuc

Romania is a country well-known for its huge salt deposits and numerous sources of salt water. As proved by recent archaeological investigations, salt and salt water have been exploited in certain spots of today's Romania since prehistory. No wonder that the map of the country under discussion shows an abundance of toponyms based on terms for *salt*. Since the great majority of the population of Romania speak Romanian (that is, a Romance language), quite many of the toponyms under discussion (e.g. *Sărata, Sărătura, Sărățel*) are based on the Romanian appellative *sare*, from Latin *sāl* (< IE **sal-*'salt'). But there also are place-names showing *slat-* (as in *Slatina*), *slan-* (as in *Slănic*), or *solon-* (as in Solonț), which represent contributions of various kinds of Slavic communities. Also, especially in Transylvania, one and the same place may have been recorded in several languages, mainly in Romanian, Hungarian and German. (Some attestations in mediaeval Latin are also worth mentioning.) Due to scarcity and lateness of documents, it is difficult to decide, in particular cases, which version appeared first. There are cases in which earlier names were translated (such situations implying bilingualism), but also cases of mere adoption (as such), followed by phonologic (and/or graphical) adaptation of toponyms borrowed from speakers of other languages. In that respect, this author considers that salt-toponyms can be profitably analyzed as reflections of earlier or more recent interethnic contacts in various regions of Romania.

Salt Production in the Andalusian Mediterranean in the Transition from Late Antiquity to the High Middle Ages

Antonio Malpica Cuello

The coasts of both the Andalusian Mediterranean and its neighbour North Africa are replete with archaeological remains evidencing the existence of a great deal of fishing activity and later preparation of salted fish. Important traces of these *garum* (fish sauce) factories have been found, but this is not the case with the Roman salt works, which must also have existed, and were probably concentrated on the same coasts. These salted fish factories seem to have largely halted production by the 4th century. The existence of fully formed salt works with obvious production capacity dating from the Middle Ages has been detected in the Mediterranean. We do not know when the Roman operations changed over to become medieval ones. There may have been a time of crisis in the former and they may have used salt wells near the sea, the various dry rivers in the Mediterranean and some marshes that also exist. Only an analysis of the archaeology, especially landscape archaeology, could clarify the issue, which is a fundamental starting point, and above all now when we are in danger of losing archaeological remains and traditional landscapes.

Organización del territorio y explotación de la sal en el área del río Salado (Sigüenza, Guadalajara), España: Antigüedad y Edad Media. Resultados de la campaña de 2008

Antonio Malpica Cuello
Nuria Morère Molinero
Adela Fábregas
Jesús Jiménez Guijarro

La cuenca del Río Salado, afluente del río Henares, se encuentra al Noroeste de Madrid, en la región de Sigüenza (Guadalajara), y corresponde a las estribaciones entre dos sistemas montañosos, el Sistema Ibérico y el Sistema Central, lo que ha convertido en una de las principales zonas de paso entre el Norte y el Sur, Noreste y Suroeste de la Península Ibérica, en momentos prehistóricos e históricos. Mas junto a su territorio, este río debe su nombre a la condición de sus aguas, que va adquiriendo a lo largo de su trazado. Por ello se planteó el Proyecto de Investigación del MEC de I + D y durante la primavera-verano de 2008 se llevaron a cabo los primeros trabajos de prospección arqueológica, así como el primer inventario de la documentación escrita conservada en el Archivo de la Catedral, con el objetivo de tener el acercamiento al poblamiento en torno al Río Salado y empezar a definir los momentos y los modos del aprovechamiento, o de la explotación de la sal en distintos momentos históricos. Se comprueba la existencia de un poblamiento continuo desde la Prehistoria hasta la Edad Media en torno al Valle con distintas formas, con especial incidencia en el entorno de las lagunas endorreicas ricas en margas salobres.

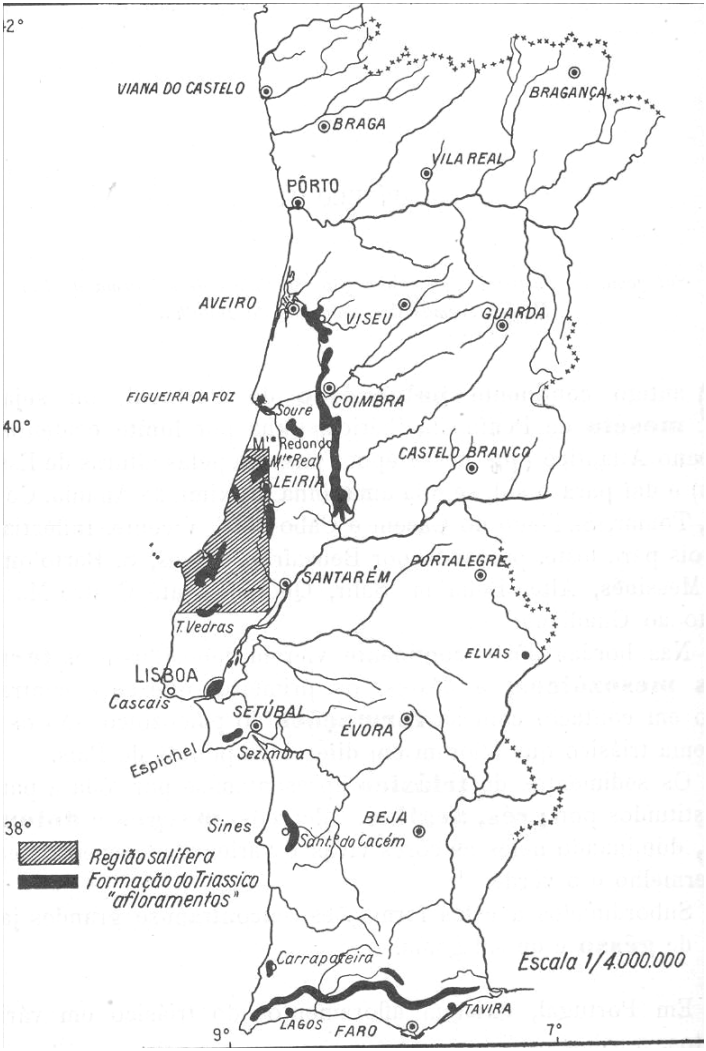
Le sel portugais: diversité et technologie - le langage entre sel de mer et sel de terre dans la longue durée

Inês Amorim

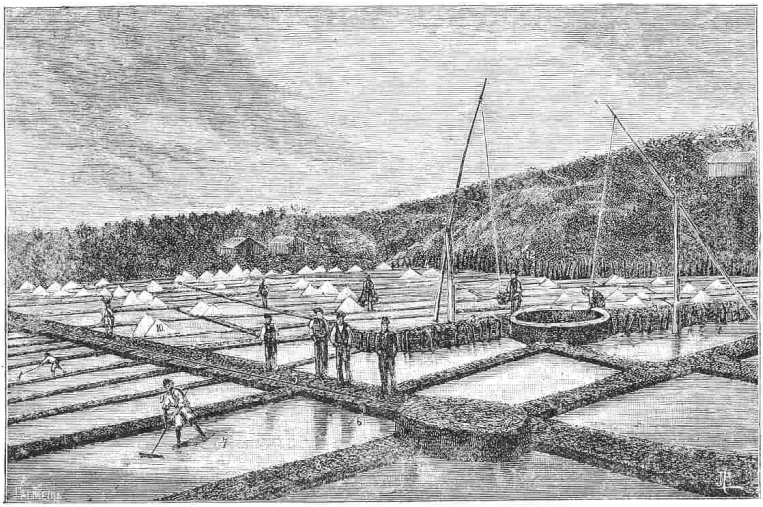
« Marinhas » désignent, dans la documentation portugaise, soit les marais-salants de la mer, soit des marais construit dans l'intérieur du pays.

Avec la création de la Commission des Services Géologiques, engagée dans des sondages destinés à la prospection du pétrole, datés de la fin du XIX^{e} siècle et des débuts du XX^{e} siècle, la localisation de mines de sel gemme se développe. La cartographie dessinée dans la première moitié du XX^{e} siècle, localise les différentes régions de sel de la terre et du sel de la mer. Les affleurements triasiques identifiés autorisaient la possibilité de mines, en se détachant deux-points: les salines de Rio Maior, qui s'organisent autour d'un ressort, ou le puits d'eau salée, et d'autre en banlieue de Leiria, exploré depuis 1927.

Notre objectif sera d'observer une sorte de langage du sel, indice des possibilités de transfert de techniques entre les marais portugais et même pour d'autres pays, parce que chaque groupe a ses caractères propres en matière d'exploitation, d'organisation du travail et de qualité du sel. Le climat, la nature des sols, la situation vis-à-vis de la mer ou non, et le système de communication avec l'eau introduisent des variables qui conditionnent / déterminent l'architecture des marais et leur technologie. Un glossaire sera le produit final à présenter.



Source: Sá (1946), p. 84



As salinas de Rio Maior, seus trabalhos de colheita, e pessoal que os executa — segundo uma photographia

FIG. 47

Legenda

1, Poço onde brota a nascente salgada. 2, Cegonhas para elevar a água. 3, Regueiras mestres. 4, Esgoteiro. 5, Regueiras. 6, Babeiras. 7, Talhos. 8, Baratas. 9, Marinheiro. 10, Rasa. 11, Armazém de sal. 12, Estacada que suporta as terras sobranceiras às salinas. (Alcoforado-Museu-Techn. p. 93).

Rio Maior (Alcoforado (1877)

Rio Maior 2005

Quadro storico sulla produzione di sale in Italia dalla fine del Medioevo all'Età Moderna

Valdo D'Arienzo

Nelle diverse aree italiane la produzione di sale, grazie alle favorevoli condizioni geografiche e climatiche, si concentrava e si concentra ancora oggi prevalentemente nelle saline marine; tuttavia la stessa produzione risulta, nei secoli compresi dal medioevo all'età moderna, alquanto differenziata, essendo in passato sfruttate anche miniere di salgemma e pozzi di acqua salata.

I differenti tipi di sfruttamento comportavano, di conseguenza, tecniche di produzioni distinte tra di loro, manutenzioni distinte, uso e abilità diverse della manodopera impiegata e anche investimenti diversificati.

La relazione che verrà presentata offrirà un quadro generale delle diverse produzioni di sale nella penisola italiana sulla scorta delle fonti archivistiche consultate e della storiografia prodotta, più o meno recentemente, sull'argomento. In particolare mi soffermerò sulle saline marine di Cagliari, Trapani e Barletta; sulle miniere di Volterra e di Calabria (andate in disuso già nel XVIII secolo) e sul "pozzo salato" di Serpico (anch'esso caduto in disuso). Nel tracciare il panorama indicato, terrò conto proprio delle diverse tecniche di produzione, di specializzazione e delle misure d'intervento adottate.

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