

Salt in Antiquity: a Historical Field in Expansion

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Abstract: *The aim of this article is to explore the historical development of a field of study that we can call "Salt in Antiquity." Initially, studies on salt in antiquity relied on 19th-century historical thought, and later, on the contributions of medievalists and early archaeology in salt-producing regions. However, the study of salt and ancient history has now achieved full independence and distinctiveness as a specific field of study. This article traces the evolution of this field from its early, tentative beginnings to its present status within the discipline of Ancient History. As a result, the history of salt in antiquity has become a well-defined field, aligning with new trends in historical and archaeological research. Written sources are being analysed from other perspectives, and collateral themes such as food, food preservation, technology and culture are being explored. Additionally, large interdisciplinary teams are being formed, and extensive projects and fieldwork are being initiated. These efforts integrate local and regional aspects, span different historical periods in their continuity, and incorporate methodologies from new disciplines focused on the environment and territory. This progress suggests an active field of study for the coming years, focusing on production sites, techniques, and the broader framework of salt exploitation.*

Rezumat: *Scopul acestui articol este de a explora subiectul sării în Antichitate. Inițial, studiile privind sarea în Antichitate s-au bazat pe gândirea istorică din secolul al XIX-lea și, mai târziu, pe contribuțiile medievistilor și ale arheologiei în regiunile producătoare de sare. Recent, studiul sării în Antichitate a dobândit independență deplină și distinctivitate ca domeniu specific de cercetare. Acest articol urmărește evoluția acestui domeniu de la începuturile sale timide până la statutul său actual. Sursele scrise sunt analizate din alte perspective și sunt explorate teme colaterale precum hrana, conservarea alimentelor, tehnologia și cultura. Aceste eforturi integrează aspecte locale și regionale și încorporează metodologii aplicate în discipline conexe precum studiul mediului înconjurător.*

Keywords: History of salt- Antiquity- Near East-Western Europe- Archaeology of salt- Thematic history- "briquetage".

1. Introduction and Background Regarding Studies on the History of Salt in Antiquity

1.1. Origin of the Studies

The history of salt as a topic of study has emerged over the last few decades due to the importance of salt to both human and animal life. Initially, research focused on more recent eras such as the Medieval, Modern, and Contemporary periods. This was largely because of the availability of economic documents, as well as texts covering social, political, and cultural

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aspects. Over time, the study of Antiquity and the archaeology of salt was incorporated, driven by the specific nature of the corresponding sources and references. These early studies laid the foundation for economic approaches to understanding the significance of salt. All of these developments have led to this study, which aims to explore different approaches that have emerged in the field of salt history in Antiquity as a distinct historical theme. In particular, our focus is on examining new trends, perspectives, and key findings that have developed in this dynamic field. In short, we aim to explore the current state of research on the topic of salt in Antiquity³.

Similar to the development of history as a field of historicist thought that began in the 19th century and included a series of pre-academic phases, as highlighted by Le Goff⁴, a distinct interest in salt, its properties, and its history has existed since the 15th and 16th centuries. For example, Marineo Sículo⁵ mentions the benefits of salt in his extensive semantic study of this mineral⁶. Additionally, the encyclopaedic work of Gómez Miedes, "Comentarios sobre la sal" ("Commentaries on Salt"), originally published in Latin, stands out as an example of academic erudition on the subject⁷. By the end of the 18th century, various pioneering works began to appear, such as those by Jean-Nicolas Démeunier⁸, which analysed the development of societal customs, both ancient and contemporary, focusing on aspects such as food. In this respect, Démeunier relied on the testimonies of both Greeks and Romans as primary sources, tracing their observations from Antiquity onwards.

Nevertheless, as a specific field of study, the first academic histories of the 18th and 19th centuries emerged, characterized by their descriptions and accounts of historical events and political and factual history. These works relied on Classical literature as a primary documentary source⁹ and featured an incipient critical methodology that incorporated epigraphy and numismatics, reflecting an interest in understanding and explaining certain facts. These histories closely followed the written accounts of the history of Rome according to Livy, defining a series of themes that would be addressed continuously in studies on the subject of salt. Livy mentions salt on several occasions, such as in his account of the founding of Ostia, the first clashes between Rome and Veii, interventionist measures regarding the price and trading of salt and Roman policies in Greece¹⁰. These wide-ranging themes were further

³ An initial summary of the historiographical picture can be found in MORÈRE MOLINERO, DOMÍNGUEZ DEL TRIUNFO, 2023.

⁴ LE GOFF, 2014.

⁵ MARINEO SÍCULO, 2004. Based on his interpretation of authors such as Ovid, Virgil, Pliny and Varro.

⁶ HERNANDO GARCÍA-CERVIGÓN, ALONSO SUTIL 2007.

⁷ RAMOS MALDONADO, 2003.

⁸ DÉMEUNIER 1776.

⁹ CASANOVA 1991; FUSTEL DE COULANGES, 1888, 11. Discussion in LE GOFF, 2005.

¹⁰ Livy's references allude to episodes that took place during the Monarchy and the formation of the Republic: creation of saltworks by Ancus Marcius (Livy I, 33, 9); conflicts with the Etruscans and with Veii (Livy V, 45, 8; VII, 17, 6; VII, 19,

explored by scholars such as Mommsen, Cagnat, and Marquardt¹¹, who sought to address key issues like taxes, *vectigalia* (revenue from taxes), the salt monopoly, the lessors of the saltworks, and the establishment of a price for salt as mentioned in the sources and supported by epigraphic evidence. Cagnat distinguishes between the Monarchy, Republic, and Early Empire periods of Roman history, focusing on the question of free exploitation of the saltworks and the salt monopoly. He concludes that during each of these periods, the saltworks were not entirely taken out of private hands¹². The roles of the publicans and lessors, and the tax aspects of salt, led to other studies at the time, demonstrating the topical nature of the subject matter¹³ within the liberalizing context of 19th-century economics, which, for Traina at least, extended beyond mere economic aspects into the political realm of the time.¹⁴ Thus, the well-known economic and social works published by Rostovtzeff include references to different salt monopolies, such as in Egypt, based on the rich papyrological evidence available, whose limitations were highlighted by Cadell¹⁵. Rostovtzeff also addressed aspects such as trade and taxes in the various Hellenistic kingdoms and, subsequently, in Rome. Despite the exhaustive use of sources, contemporary realities appeared to influence the author's view of Antiquity¹⁶.

The allusion to food, however, was not based on Livy's accounts but on those of Cato, especially his reference to the addition of salt to salted fish in the diet of slaves (*Cat. Agr.* 65-67)¹⁷. These references dealt with economic matters, trade, prices and monopolies and laid the early foundations for research in the history of salt in Antiquity. Within this context, we can also highlight entries under the headings of "salz" and "sel" in various encyclopaedias published at the time¹⁸.

Later, the Annales School exerted its influence in the 1950s-1960s, driven by medievalists who promoted this school and the "New History" movement. With a series of thematic studies that were integrated into more holistic and global perspectives, based on a series of historical periods that were necessary but not indispensable¹⁹. This led to a renewed focus on the significance of salt and the importance of thematic studies in history. This influence began with the creation of a *Questionnaire pour une enquête sur le sel dans l'histoire au moyen âge et aux temps*

9); elimination of the trade that had lain in private hands up until that point (Livy II, 9, 4); establishment of different prices and the creation of tax on salt by Livius Salinator in the year 204-203 BC. (Livy XXIX, 37, 3); and Paulus Emilius' imposition of a prohibition regarding the importation of salt into Macedonia (Livy XLV, 29, 13). The Augustan approach to the work of Livy has been extensively highlighted: SAITTA, 1989.

¹¹ CAGNAT 1882; MARQUARDT 1988.

¹² CAGNAT 1882, 238.

¹³ This is raised by Cagnat, following the studies of Cohn in 1873: CAGNAT 1882, 238- 240.

¹⁴ TRAINA 1992, following HAUSER 1927, 7.

¹⁵ CADELL 1966.

¹⁶ MOMIGLIANO 1954; ROSTOVZEFF 1969; ROSTOVZEFF 1988.

¹⁷ MOMMSEN 1953, III/ 2, 839.

¹⁸ PAULY-WISSOWA'S, 1861; DAREMBERG, SAGLIO 1873.

¹⁹ LE GOFF 2014, 42.

modernes, by Jeannin & Le Goff (1956)²⁰. This approach was further developed by Michel Mollat in his work as a whole. These authors systematically addressed all the issues associated with salt throughout history, marking the beginning of thematic studies within the field²¹. The role of the medievalists was essential, as they focused on a period replete with wide-ranging written documentation²². They were subsequently joined by historical currents featuring thematic studies²³ and economic studies relating to Antiquity²⁴, including research on Ostia²⁵.

1.2 Archaeology's First Contribution

The history of salt effectively evolved alongside the establishment of archaeology as a discipline and the identification of material culture associated with salt production²⁶. When salt was obtained artificially through brine evaporation, this process produced large quantities of ceramic remains, known as *briquetage*, which were gradually discovered and identified in salt-producing regions. These remains appeared in early, local monographic archaeological works wherever salt existed as a resource and had been produced artificially. In this way, the study of the territory preceded the academic field as an early part of salt studies. In the Region of La Seille (Lorraine, France)²⁷, for example, salt production began to be associated with ceramic fragments of supports, blocks, and containers used in the open-pan salt production process. As a result, salt-producing regions featured prominently in the early years of the history of salt due to pioneering archaeological studies. In view of this, it might even be said that the thematic history of salt overlapped with the first regional archaeological endeavours. For instance, in his doctoral thesis, Gouletquer studied briquetages in Bretagne²⁸. In England, a conference on salt production was held focusing on the *Red Hills* of Essex, as well as Sussex and Dorset, covering the Iron Age, Roman Period, and the Medieval Period. The conference

²⁰ JEANNIN, LE GOFF 1968. This has recently been resumed and analysed: MORÈRE 2020.

²¹ MOLLAT 1968.

²² In the late 1970's, the works of Hocquet, a Medievalist and follower of Mollat, focusing on Venice and its wealth, which was founded on its monopoly over the salt trade in the Mediterranean, were essential: HOCQUET 1978; HOCQUET 1994, LITCHFIELD et al., 2001. We might also mention the economic studies that emerged and the incorporation of archaeology: PASTOR DE TOGNERI, 1963; GONZÁLEZ RUIZ, RUIZ DE LA PEÑA, 1972; MALPICA CUELLO 1982; LADERO QUESADA 1987; MALPICA CUELLO 1991; MALPICA CUELLO 2005.

²³ Focusing on periods other than those of interest to us here, mainly covering the middle ages onwards, although they did contain introductory sections regarding the earliest stages of salt production. The first summarising works: BERGIER 1982; MULTHAUF 1978; ADSHEAD 1992.

²⁴ GABBA, PASQUINUCCI 1979; TRAINA 1986. Economics and transhumance have always been collateral themes in studies on salt-producing territories: CORBIER 1991.

²⁵ REBUFFAT 1974.

²⁶ Although important Ancient literary sources on salt have been preserved, such as Chapter XXXI of Pliny the Elder's *Natural History*, amongst many other texts, ancient writings are extremely variable and limited, with the development of archaeology coming to play an essential role.

²⁷ BERTAUX 1979.

²⁸ GOULETQUER 1970.

included studies from Retz in France, the Valley of Saale in Germany, and De Panne in Belgium, featuring a possible Roman salt mine. The historical saltworks of Northwich in England were also addressed. England's long legacy of salt production is evidenced by the country's place names and old road network, which were established around the first salt-producing regions²⁹. In other words, when the roads were built, the first salt-producing regions were simultaneously established. The fire-based technique for salt production was used in both inland and coastal areas, requiring brine to be concentrated and evaporated by the action of fire to produce salt. This technique has been in use since the Bronze Age, saw considerable development during the Iron Age, continued in Roman times, and persisted up to the 19th century. It was during this period that pioneering works on salt and its associations with the economy and technology were published, through the efforts of authors such as Riehm, Nenquin, and Forbes³⁰.

In a broader context, the first works on the diet of ancient peoples appeared, largely based on an archaeological approach. One of the most notable publications was that of Don and Patricia Brothwell³¹, which not only compiled archaeological data but also drew on texts and iconography as sources. Among a wealth of other information, their book presented an overview of the salt industry during Neolithic times and the Roman Age in Gaul and Britannia, effectively illustrating the industry's expansion over time. Another pioneering but isolated work was the 1952 study by Grimal & Monod on *garum*³². And, as if presaging the incipient archaeological research, several isolated studies were published on the Gibraltar Strait Circle in the West, salting processes, and salt. Consequently, archaeological congresses began to be held in Spain, including the First Archaeological Congress of Spanish Morocco in 1953. This congress published isolated accounts such as Vila Valentí's study on salt production and trade, and on various salt measures, an innovative study that was not pursued further³³. Archaeology relating to salting processes was also fundamental at the time in terms of introducing salt³⁴ given that this mineral was a basic component for in food preservation. Research on the salting industry and products like *garum* gained momentum in the last few decades of the century, focusing mainly on the Western Mediterranean and the Atlantic coast. Following early studies, such as the one by Grimal & Monod (1952), other local studies appeared based on different epigraphical, archaeological (amphorae, the remains of salting process infrastructures, etc.) and site discoveries. The work of Etienne on *garum*³⁵ in society, which sparked widespread debate, suggested that salt, essential for salting processes, had led to a state monopoly on both

²⁹ Colchester Archaeological Group, 1974.

³⁰ RIEHM 1961; NENQUIN 1964; FORBES 1964.

³¹ BROTHWELL, BROTHWELL 1969.

³² GRIMAL, MONOD 1952. As of the 1980's, salting processes would be a mainstay for frequently tackling the study of salt.

³³ VILA VALENTÍ 1954; JAÚREGUI 1954; the latter work in conjunction with Tarradell.

³⁴ ANDRÉ 1981.

³⁵ ETIENNE 1970.

salt and *garum* during the Barcid and Roman periods. Significant contributions were also made by Ponsich and Tarradell, who focused on the Western Mediterranean and the Atlantic³⁶. These works laid the foundation for incorporating the ancient history of salt into historical studies, despite relying on few written sources. Moreover, the emergence of archaeology, initially focusing on the Prehistoric Period and, later on, the Proto-historic and Roman periods, shaped the themes and issues related to salt production. This included examinations of different brine concentrations, stages of production, salt cakes, transport and trade, and questions of concentration and evaporation. However, studies had yet to compile sources, thoroughly investigate salt-producing territories, or analyse the various environments that existed in antiquity.

2. The Emergence and Consolidation of Ancient History in Studies on Salt in the West

The ancient history of salt began with the groundbreaking proposal by Giovannini, who revolutionised the way salt was considered within the realm of ancient history. In the title of his work, he combined the city of Rome with two ideas: salt and fortune³⁷. Giovannini pointed out the scarcity of studies on salt and the omission of Ostia's saltworks due to the prevailing historiographical focus on institutions and military values. In contrast, he highlighted the fact that Rome only became an expansive and conquering city once it had seized the saltworks located at the mouth of the Tiber. He also highlighted the overthrow of the Etruscan city of Veii, which marked the end of Etruscan power and led to the founding of the *castrum* at Ostia, events described by Livy that culminated in 396 BC. Giovannini stressed that Rome's foundation and development were significantly influenced by its access to the saltworks on the left banks of the Tiber, founded by Ancus Marcius, who also seized the *Silva Maesia* area, gaining access to the sea and the *Via Salaria*³⁸. These strategic sites were established before the fall of Veii in 396 BC and were later complemented by territories taken from this wealthy city, justifying Rome's expansion. Giovannini's hypothesis about salt's capacity to influence historical processes and conquests is crucial. He argued that access to salt transformed Rome's ability to expand. In addition, he revisited broad themes previously discussed by Mommsen, such as the founding of the saltworks at Ostia (*Romulus, Ancus Marcius*), the clashes (over salt) between the cities of Veii and Rome at the end of the fourth century BC, the elimination of the private salt trade and the creation of a salt tax (i.e., a monopoly on salt). The only difference between the two involved their historical interpretation, with Giovannini disputing Livy's account and his anachronisms, and Mommsen applying a more historicist approach. However, Giovannini went further in his proposal regarding the role of salt in Rome's conquests and analysed sources to support his hypothesis about the necessity of salt for human survival. In this respect, he distanced himself from mere political or episodic considerations and, while still relying on

³⁶ PONSICH, TARRADELL 1965; PONSICH 1998. This line of research would remain valid over time.

³⁷ GIOVANNINI 1985.

³⁸ GIOVANNINI 1985, 381.

written sources, he moved towards the quantitative studies that would be conducted in later years. For the first time, salt was given a central role in historical processes of Antiquity, leading to a series of monographic studies that spurred the wealth of research that followed in this field.

In contrast to the existing archaeology of salt in the Atlantic and Central European regions, which largely relied on material remains³⁹, Giovannini's work shifted the focus to the Classical Mediterranean as a subject of research. From this point, studies proliferated and were widely disseminated. Chevallier's studies on salt as an indispensable foodstuff emerged in 1991⁴⁰, followed by Manfredi's work on the Punic world based on epigraphy in 1992⁴¹. Additionally, the works of Traiana⁴², Murolo⁴³, Moinier⁴⁴, Mangas and Morère⁴⁵ provided a general overview, incorporating the Iberian Peninsula as a subject of study. Knowledge of written sources became a fundamental requirement, leading to the creation of compilations and inventories of sources related to different territories and the Ancient World in general. Studies on Ostia were complemented by those on the cult of Hercules, the Forum Boarium, and sites of exchange⁴⁶. Simultaneously, studies on salt employing a trans-disciplinary approach also began to gain traction within the field⁴⁷.

2. The First Studies on Salt in Eastern Antiquity

At the same time, beyond the Mediterranean, studies began to appear on other regions for which evidence dating from Antiquity existed, in particular the Near East. Vital Cuinet discussed, among other resources, salt deposits in Mesopotamia (including Syria and Turkey) dating back to the late 19th century, a period when this territory was still under Ottoman control⁴⁸. However, few studies emerged on salt for the period prior to the development of the caravan trade based in Palmyra, which flourished during the Roman Period, despite the

³⁹Although general archaeological studies on the Atlantic coast continued, a number of historical approaches also began to emerge THOEN 1986; CABAL, THOEN, 1985.

⁴⁰In a work that paid homage, in fact, to Michel Ponsich: CHEVALLIER 1991; MORÈRE 1991.

⁴¹MANFREDI 1992.

⁴²TRIANA 1992.

⁴³MUROLO 1995.

⁴⁴MOINIER 1986; PERRICHET-THOMAS 1993.

⁴⁵MORÈRE 1994; MANGAS, HERNANDO 1990-1991.

⁴⁶LEVI 1996; ALGREEN-USSING, FISCHER-HANSEN 1985; MORELLI et al, 2004; SERRANO ORDOIZGOTI 2018.

⁴⁷Granada congress in 1995: MALPICA CUELLO, GONZÁLEZ ALCANTUD 1995; Cagliari Congress in 1998; Weimar Congress in 2001; Nantes Congress in 2004: HOCQUET, SARRAZIN 2006; and the last Congress in 2006 in Sigüenza (Guadalajara): MORÈRE MOLINERO, 2007. These studies have continued at the Congresses on the Anthropology of Salt: ALEXIANU et al., 2011; ALEXIANU et al., 2023 (publication from the Second Congress in 2015); PLATA 2022. Other congresses can be highlighted due to the importance of the papers that were presented, including: SAULE 1992; WELLER 2002; FIGULS, WELLER, 2007; MOLINA, SÁNCHEZ 2005; WELLER et al., 2008.

⁴⁸CUINET 1891.

significant role salt played in Mesopotamian societies. Specifically, these studies began with an analysis of the desertification of Mesopotamia⁴⁹, continuing with the work of Buccellati and the problems relating to salt measures, as tackled by Potts and Buccellati. BRB's⁵⁰ or "bevelled rim bowls" were also studied, having been discovered at sites up to the Middle Euphrates in the fourth millennium (e.g., at the site of Qraya in Syria). Additionally, evidence was unearthed that attested to the production and transport of salt at the beginning of the urbanization process, a development that spread from the south to the north of Mesopotamia⁵¹.

Potts also analysed references in Mesopotamian texts regarding the uses of salt since Neolithic times, including its use in tanning leather, food preservation, religious rituals and medical therapies. He highlighted the existence of ten different types of salt in Mesopotamia, as identified in Assyrian texts and third-millennium texts by a "salt gatherer"⁵². Classical sources also reflect these regional differences, such as the classification offered by Pliny the Elder in Book XXXI⁵³. Despite its rich potential, there have been few studies on this matter since then, although the theme has continued to the present day⁵⁴.

Continuing with the East, specifically the Persian world – the heir to Mesopotamian culture – analyses have been attempted regarding the evidence found in Greek sources that refer to salt, principally Polyaeus (Pol. IV, 3, 32), which attest to the use of salt and salt combinations for food purposes⁵⁵. Although an equivalent term has yet to be identified in Persian texts, it appears that salt was one of the food elements employed to pay workers under royal service. The Persian banquet can perhaps be compared to those of previous periods, where texts such as the Banquet Stele of Ashurnarsipal II from the Neo-Assyrian Period reveal that numerous foods and spices, including salt, were present on the banquet table. The salt hills in the southern region of Fars, where Persepolis was located, are also well-known. This discovery is complemented by a more recent find in Iran: the ancient saltworks of Douzlak. Until recently, our knowledge was limited to Herodotus' reference to the bitumen, salt, and oil exploitations in the nearby region of Susa (Hdt. VI, 119, 2-3). It is important to note that since the time of Homer, Classical sources have referenced the Eastern World, as the Greeks had maintained links with this region since the beginning of recorded history. With the threat of Persian attacks on Greek territory, references to the Persians and their ways of life increased, culminating in the historical and ethnographic work of Herodotus. Studies based on written sources and archaeology have gradually been complemented by others, including recent

⁴⁹ JACOBSEN, ADAMS 1958.

⁵⁰ POTTS 1984; BUCCELLATI 1990; HOPKINSON 2007.

⁵¹ Although a use has also been suggested recently linked with bread: MONTERO FENOLLÓS, SANJURJO SÁNCHEZ, 2016.

⁵² POTTS 1984, 253.

⁵³ Pliny, *HN*, XXXI, 39-45.

⁵⁴ HOPKINSON, BUCCELLATI 2023.

⁵⁵ LEWIS 1987.

conferences and academic works that have increasingly focused on aspects such as the ecosystem of regions like the Achaemenid Persian Empire⁵⁶. These studies shed light on the extraction of salt throughout the Empire, which was part of the state apparatus that mobilized craftsmen and professionals for various monumental constructions. The salt extraction tools used by the mummified individuals discovered at the still active saltworks of Douzlak (which means "salty earth" in Azeri), located near Chehrabad in northwestern Iran⁵⁷, have also been analysed. We can identify a subsequent period of use dating from the Parthian and Sassanid Periods, during which extraction activities continued, organized on a regional level. Analysis of these remains continues today using a multi-disciplinary approach, forming part of a large-scale study and preservation project for the saltworks and its mummies⁵⁸.

Egypt provides another arena for these studies, constituting a prime territory for scholars due to the important Classical sources that reference this region. Herodotus' descriptions are among these sources, informing us that the oases in the Sahara produced salt (Siwa, or Lake Mareotis⁵⁹, amongst others⁶⁰). He mentions the saltworks (*taricheia*) at Pelusium (Hdt. II, 15,1 and Pliny *HN* XXXI, 78) on the Delta, which implies the existence of salt flats. Herodotus also references the Libyan caravan route (Hdt. IV, 182-185) across the Sahara, highlighting the importance of salt transport and other products throughout North Africa⁶¹. Furthermore, he establishes a connection between the salt resources at oases, such as Augila, and the various peoples who inhabited them, and he describes these inland salt deposits, which were likely formed by the gradual evaporation of saltwater⁶². In effect, salt was analysed to understand how trade with the salt-deficient subtropical regions facilitated exchanges, likely involving gold and slaves, from the Niger region. These would have been exported to Egypt and the Mediterranean in exchange for luxury items and olive oil, a route likely in use since at least the sixth century BC. Diodorus also refers to the border region between Egypt and Syria as a territory with ample salt resources (Dio. I, 60, 6-7). Nevertheless, the archaeological records on salt production and storage in this region and period are scarce, though some progress has been made⁶³. Papyrus writings have provided key information regarding taxes and production

⁵⁶ «Paleopersepolis: Environment, Landscape and Society in Ancient Fars»: BALATTI, KLINKOTT, WIESEHÖFER 2021.

⁵⁷ AALI, ABAR et al., 2012; AALI, STÖLLNER et al., 2012.

⁵⁸ YOSHIDA, BAGHERPOUR, SHIRAZI 2021.

⁵⁹ Salt production at some of these sites would be studied: NICHOLSON, SHAW, 2000.

⁶⁰ In Ancient Egypt, salt was available at the oases of Siwa, Kharga, Dakhla and Farafra, the regions close to Memphis, Thebes, Elkab and Lake Mareotis. On the coast salt was extracted from seawater and, in the south, it was extracted from the salt marshes and even from the desert earth. Furthermore, sacks of salt, salt-cakes and "bricks" have been discovered in tombs, on lists and as products for trade, to which we must also add the Egyptians' capacity to produce cured/salted meat (NICHOLSON, SHAW 2000, 663).

⁶¹ LIVERANI 2000.

⁶² LASZLO 2001. Furthermore, these early accounts serve to establish a connection with the routes that were maintained throughout the region in Medieval and modern times.

⁶³ ALEXANDER 1993.

organisation, detailing the *haliké* and other taxes that emerged through the introduction of currency in the fourth century BC. Initial studies on Hellenistic and Roman papyri offer insights into the link between the *haliké* tax and salt, particularly items concerning the *hals orkytos* (“excavated” salt, rock salt)⁶⁴ and its illegal ownership⁶⁵, confirming the existence of a salt monopoly in Egypt under the Lagid Dynasty. These early approaches were followed by De Cenival's work in 1983. Recent analyses of extensive papyrological evidence have been updated, combining the study of other sources (*óstraka*, Classical sources) to create comprehensive works on fiscal affairs in Hellenistic Egypt⁶⁶. The most extensive compendium is that of Clarysse & Thompson (2006)⁶⁷, consisting of two volumes analyzing the *haliké* in 54 papyri. In addition to offering an updated *corpus*, these studies focus on reconstructing the imposition of this tax in Ptolemaic Egypt, encompassing different categories, rates, and the tax-gathering process⁶⁸. From these papyrological studies, we know that officials monitored the salt trade, that there was a position of “salt carrier” (perhaps for rock salt), that the right to sell salt was auctioned to certain individuals, and that salt originated from various places and was transported using specific barges (*kerkouroi halegoi*)⁶⁹. However, despite extensive documentation on the tax, there is no information about the salt itself, and questions regarding its production and supply still remain⁷⁰. In this respect, there is no bibliography on the specific extraction sites during this period, unlike the studies available on other regions such as Athens and Attica in the Greek world⁷¹.

Although the extent to which this tax was linked to salt during this period is unclear, its widespread presence in literary sources indicates that salt, alongside other products such as oil, beer, papyrus, and textiles, was a major industry throughout the country. This significance appears to have persisted, as evidenced by the presence of establishments selling salt⁷² in the nearby city of Arsinoe during the Roman Period and various toponyms related to salt⁷³. This trend continued into Late Antiquity, as studies on the use and exchange of salt in the early Christian church suggest. Literary evidence, such as that preserved in Cassian's writings (*De inst. coen.* XXII) for Egypt, as well as texts from papyri and *ostraka*, document salt production, its function in rituals, its use as food for hermits, and its role in exchange among monasteries

⁶⁴ CADELL 1966.

⁶⁵ MCGING 2002.

⁶⁶ MONSON 2019, with references.

⁶⁷ CLARYSSE, THOMPSON 2006a, 2006b.

⁶⁸ CLARYSSE, THOMPSON 2006b, 36-89.

⁶⁹ Might this form of transport recall the depiction of boats loaded with salt on the Dead Sea, as represented in the Mosaic of Madaba? (FRIEDMAN 2012).

⁷⁰ CLARYSSE, THOMPSON 2006b, 38.

⁷¹ CARUSI 2008.

⁷² DARIS 1981.

⁷³ CADELL 1966, 280.

during the rise of Christianity⁷⁴. In addition to investigations involving production and taxation, salt has also become a subject of various food studies⁷⁵. Thus, Egypt and the East present considerable potential for future research.

4. The Development of Studies on Salt in Antiquity throughout the West and Current Trends

Since the year 2000, following the earliest studies, a range of specific works on Classical sources has emerged. These include inventories applied to various territories (such as the Iberian Peninsula) and studies on specific authors like Herodotus, geographers such as Strabo, and naturalists like Pliny the Elder⁷⁶. These studies also encompass activities related to salt⁷⁷. Pliny the Elder mentions different qualities and types of salt across many regions in the Mediterranean, including Sicily, Phrygia, Cyprus, Egypt, Bactria, India, Arabia, Spain, Crete, Africa, Babylon, Attica, the Island of Euboea, and Thebes (Pliny *HN*, XXXI, 73-92). Both Pliny and Strabo provide information on saltworks in Eastern regions such as the Pontic area, Cappadocia, other parts of Asia Minor and even distant locations like India (Str. V, 2, 6). It is important to consider the particularities and specific characteristics of Classical sources on salt in Antiquity, which offer uneven and often sparse coverage of the topic of salt, and very often, a complete silence on the subject even when we know that salt existed and was produced. Some regions are mentioned more prominently than others, with references often emerging in the context of conflicts, economics, trade, and production.

After the year 2000, research began to focus on pre-Classical periods⁷⁸, culminating in the monographic work by Carusi on salt in the Greek world⁷⁹, a significant milestone in the history of salt in Antiquity. Carusi provided an exhaustive analysis of written, epigraphic, and archaeological sources, enabling her to propose the first inventory of salt resources throughout the Mediterranean. She analysed complex issues, such as the contrast between the abundance of available documents and the difficulty of locating details regarding the extraction and exploitation of salt, with Athens and Attica being notable examples. She also tackled the question of production and trade, which seemed to reside in private hands, although some epigraphic evidence suggests this was managed by temples. More recently, Carusi has analysed the dynamics of salt exchange and salt-preserved foods throughout the Mediterranean in the Classical Period, particularly in markets in areas like the Northern Aegean (mainly Thrace) and the Black Sea⁸⁰. In this regard, she has addressed the most complex issues relating to salt,

⁷⁴ IAȚCU 2023.

⁷⁵ DARBY et al., 1977.

⁷⁶ MORÈRE 2002; BONGHI JOVINO 2002; ALEXIANU 2007; CARUSI 2008A; MORÈRE 2008; PIKULSKA 2008; MANGAS, HERNANDO 2011; MOINIER 2012; MORÈRE 2014; MOINIER, WELLER, 2015.

⁷⁷ PEREA YÉBENES 2006.

⁷⁸ KOPAKI, CHANIOTAKIS 2003; CARUSI 2006; CARUSI 2007.

⁷⁹ CARUSI 2008.

⁸⁰ ALEXIANU 2011; CARUSI 2015.

including its exploitation and circulation throughout the Greek world and the Hellenistic kingdoms⁸¹.

4.1. The West and the Classical World

More recently, several new approaches have emerged that focus on the quantitative aspects of salt as a food item, as well as its consumption and trade, particularly in the Greek world. These studies concentrate on the only quantitative account provided by literary sources: the salt consumption of a slave as described by Cato (*Agr.* 65-67). Cato recommended adding salt to the cereal diet of slaves, which included salt-preserved foods such as *allec*. This perspective was briefly raised by Giovannini in his hypothesis about Rome's expansion due to the conquest of the saltworks, emphasizing the necessity of understanding the salt needs of the population in Antiquity⁸². However, these new studies analysed various cases in depth for the first time. Another recent approach involves studying salt culture and its role in food⁸³. A larger number of Roman sources are available in this respect compared to Greek sources. Notably, we have *Apicius*, a collection of Roman recipes from a fourth-century AD based on a first-century AD original document. This essential source highlights the importance of *garum*, a salting method present in almost every recipe, whereas in the Greek world, salt was mainly used in recipes for fish and salt-preserved products. Salted products were key foodstuffs for the community, as seen in Greek references (Ar., *Eccl.*, 606), whilst salt was also considered to be a condiment, being included in fish recipes (Ath. *Deipn.* VII, 321 c-d)⁸⁴. As a result, salt remained a key focus in studies of salt-preserved foods, fishing, and the trade of these products in the Western Mediterranean, particularly in the 1960s. Notable works from this period include various studies on the Phoenician-Punic Period and North Africa⁸⁵. Gradually, various monographs emerged on these topics, such as the volume published by Costa & Hernández⁸⁶, which covers production, consumption, and trade of salt-preserved foods from the Iberian Peninsula and their impact on other Mediterranean regions, including Greece.

No summarising work, however, appeared until the monograph published by R. Curtis in 1991⁸⁷. In this study, Curtis extended his research beyond the Western Mediterranean to include chapters on the Empire's eastern provinces, with a section devoted to more distant

⁸¹ Including her interpretation of Ptolemaic *haliké*, a tax whose name derives from salt and which also appears under the Seleucid Empire, a very well-worked theme: *vide supra*.

⁸² CARUSI 2011; MOINIER 2011; CARUSI 2015.

⁸³ MORÈRE MOLINERO 2016; BARAT 2017; MORÈRE MOLINERO 2022.

⁸⁴ Olson & Sens, 2000. The work by Athenaeum of Naucratis, *Deipnosophists* (normally translated as "The Banquet of the Learned"), dating from the third century AD, brings together the writings of his predecessors regarding banqueting practices in the Greek world, although it also provides details on other cultures, such as the case of banquets at the Persian Court.

⁸⁵ MEDEROS MARTÍN, ESCRIBANO COBO 2005.

⁸⁶ COSTA, HERNÁNDEZ, 2012.

⁸⁷ CURTIS 1991.

regions such as the Black Sea. This region, in particular, has been the subject of increasingly comprehensive studies, although these have emerged somewhat later compared to the western reaches of the Empire⁸⁸. More recently, following the trend towards more localized studies, notable mentions include the CETARIAE 2005 International Congress⁸⁹ for studies on the salting industry on the Iberian Peninsula, the monograph published by Étienne & Mayet⁹⁰, not to mention a similar study by Botte⁹¹ covering Southern Italy and Sicily. Botte's work also provided a brief look at the Black Sea, the Iberian Peninsula, Africa, Gaul (Mediterranean and Atlantic), and the rest of Italy. Researchers from the fields of archaeology and amphoric epigraphy have also addressed the question of salt⁹², as salt-preserved foods were studied alongside production and exploitation sites. Recently, this analysis of food salting sites has been complemented by studies on the production of Tyrian purple⁹³, and other materials⁹⁴. This has led to a vibrant area of research focused on salt and salt-preserved foods in the Black Sea region, centred around the fishing and salting industries. The importance of products from this region, including those previously mentioned, is reflected in literary sources and the numerous Greek colonial settlements established from the seventh century BC, which were revitalized during the Roman Period in the second century BC. Since the 1930s, studies have attested to the salting factories at Pontic settlements, complementing those of the Western Mediterranean, leading to a series of works that have become monographic series⁹⁵. These studies have gradually established models and comprehensive analyses⁹⁶, effectively defining the concept of a halieutic circuit encompassing fishing and salt resources, related handicraft activities⁹⁷ and the consequent trade, as studied through epigraphy⁹⁸. Other thematic developments include regional studies focused on areas rich in mined salt, though archaeology has only made isolated discoveries. While regions like Cardona (Spain) or Hallstatt were exploited in Prehistoric times⁹⁹, Dacia has been the focal point for regional studies in the Roman Period in recent years¹⁰⁰. Epigraphy has helped define the rich salt deposits in this region, the organization of salt production following Trajan's conquest, and the significant role played by

⁸⁸ This line of research would be strongly pursued up until the present day, as we shall see, based on amphoric epigraphy.

⁸⁹ LAGOSTENA et al., 2007.

⁹⁰ ETIENNE, MAYET 2002.

⁹¹ BOTTE 2009.

⁹² GARCÍA VARGAS, MARTÍNEZ MAGANTO 2006; MARTÍNEZ MAGANTO, GARCÍA VARGAS 2009.

⁹³ FERNANDEZ URIEL 2010; LOPEZ MEDINA et al 2023.

⁹⁴ DELRUE, NAPOLI 2007.

⁹⁵ BEKKER-NIELSEN 2005

⁹⁶ DUMITRACHE, 2014; BARAT, 2017; DRIARD et al., 2017.

⁹⁷ DUMITRACHE 2014.

⁹⁸ VARGA 2023.

⁹⁹ FIGULS, WELLER 2007; KERN et al. 2013.

¹⁰⁰ ALEXIANU et al. 2023.

salt resources, especially the salt mines¹⁰¹, which help to explain part of the line of fortifications built by the Romans¹⁰².

4.2. Archaeology's Definitive Contribution to the Study of Salt

Although our study of research sources is far from exhaustive, Classical sources offer a vast array of interpretative and analytical perspectives. Recently, several new directions in the study of salt have emerged due to new archaeological discoveries¹⁰³. Territorial and thematic studies, supported by written and epigraphic sources, have significantly broadened the field – an expansion that has been accompanied by various archaeological explorations and initiatives¹⁰⁴. For instance, in the north of France, within Gallia Belgica, salt production workshops using *briquetage* techniques from the end of the Iron Age have been documented. The Roman conquest brought about key changes, including the disappearance of several workshops in the first century AD, such as that of Conchil-le-Temple. Despite these changes, there was a sense of continuity in the region, particularly among the Morini and Menapii tribes, as evidenced by archaeology and epigraphy (e.g., Ardres, Steene, and Pitgam)¹⁰⁵. Similar salt production methods have been identified in certain inland areas of the United Kingdom, where brine was stored in water tanks before being evaporated by heat¹⁰⁶. In these cases, it is important to note that open-pan salt production and *briquetages* began with prehistoric periods¹⁰⁷ and continued to be a primary means of extraction up until the 19th century, as demonstrated by ongoing excavations. In examining *briquetages*, various factors were

¹⁰¹ MIHAILESCU-BÎRLIBA 2018; MIHAILESCU-BÎRLIBA, ASĂNDULESEI 2019; MIHAILESCU-BÎRLIBA 2022.

¹⁰² ȚENȚEA, MATEI-POPESCU 2015.

¹⁰³ An extensive bibliography also exists based on epigraphy and on inscriptions that mention *salinatores* or *salarii*, amongst other aspects. Recent studies include: CEBEILLAC-GERVASONI, MORELLI 2014; BÎRLIBA, ASĂNDULESEI 2019.

¹⁰⁴ MENANTEAU et al., 2003; CASSEN et al., 2004; MALPICA CUELLO et al., 2011; MORÈRE MOLINERO et al., 2013; VALIENTE CÁNOVAS et al., 2019.

¹⁰⁵ BOUTET 2007; CABAL, THOEN 1985; NAPOLI 2007.

¹⁰⁶ ARROWSMITH, POWER 2012.

¹⁰⁷ We shall only present a brief summary, given that the bibliography is extremely extensive and in order to not to enter the realm of Antiquity, although we should remember that *briquetages* marked the beginning of this line of research. These materials employed for open-pan salt-making have been progressively discovered in territories as far south as the Iberian Peninsula since the Neolithic Age and the Bronze Age, and, of course, throughout a large part of Europe, serving as a means of identifying the origins of salt culture: VOGT 1999; BRIGAND, WELLER 2005, and JIMÉNEZ GUIJARRO 2011; ESCACENA CARRASCO et al. 1996, and TERÁN MANRIQUE, MORGADO 2011 (mouth of the Guadalquivir and Andalusia); VALIENTE CÁNOVAS et al. 2002; BUENO RAMÍREZ et al., 2017; OÑATE et al. 2023; JIMÉNEZ-ESPEJO 2024 (Espartinas and the Central Peninsula); DELIBES 1993; DELIBES DE CASTRO et al. 1998; GUERRA DOCE et al., 2017 (Villafáfila in Zamora); ARENAS, MARTÍNEZ 1999; MEDEROS MARTÍN, RUIZ CABRERO 2000-2001; CARRILERO MILLÁN 2005; TERÁN MANRIQUE 2017; QUIXAL SANTOS 2020 (transhumance and cattle-raising routes). Outside the Iberian Peninsula, cases involving Prehistoric studies are also extremely frequent in Turkey, Romania, Italy, the United Kingdom and Germany (ERDOGU, OZBASARAN 2008; MONAH, DUMITROAIA 2007; PASQUINUCCI, MENCHELLI 2002; ATTEMA, ALESSANDRI, 2012; SEVINK et al. 2021; SAILE 2002; Hees, 2002; LANE, FIELDING, 2024), as well as in France, specifically on the northern and western coasts, with their seafaring cultures, and also in inland areas (FIGULS, WELLER 2007).

considered, including climate, the location of workshops in proximity to brine sources, and different production stages, such as concentration and condensation. Additionally, aspects like the trade and distribution of the resulting salt cakes were also studied. These works have highlighted geographical and environmental factors as key elements of analysis, extending beyond a mere examination of material remains from prehistoric periods and antiquity¹⁰⁸.

Other sites where saltworks have been studied include Bas-Lauvert (Antibes, France)¹⁰⁹. At a regional level, salt-making sites have been identified in locations such as Kaunos, an ancient city in Caria, southwest Turkey. These findings are based on Pliny's references to the curative properties of salt. A comparative and more global study has been carried out at this site¹¹⁰, where almost 50 circular salt basins of considerable diameter were discovered in 2005. These basins are unique and represent the first archaeological evidence of salt production in ancient Anatolia¹¹¹. This discovery prompted a series of archaeological and geophysical studies, which have dated the use of the saltworks to as late as the tenth century AD. These studies on the Peninsula have continued to the present day.

However, the most significant archaeological contribution in recent years has been the discovery and excavation of the first artificial saltworks from the Roman period, particularly at coastal sites, although studies have also focused on inland saltworks¹¹². One underlying issue has been the evolution of sea levels. The distinction between natural salt and artificial salt, as mentioned by Varro and Pliny the Elder, has led to an ongoing search for artificial salt-making infrastructure, of which very few descriptions have survived. The most complete description, though historically late, appears in a travel account by Rutilius Namatianus, who describes the *salinae* and their composition, specifically those at the villa of his friend Albinus (*De reditu* 475-490). There are also interpretations referring to saltworks in accounts by Manilius (*Astr.* V 682-692) and possibly by Pliny the Elder (*HN XXXI*, 81). These mentions of artificial saltworks touch on their exploitation, ownership, and the differences between inland and coastal infrastructure¹¹³. Additionally, there are distinctions between Mediterranean saltworks and those on the Atlantic coast, with key technical questions relating to the supply and circulation of water. The first significant discovery was made in Vigo, based on the work of Juan Carlos Castro, who unearthed the best-preserved saltworks dating from the Roman period at O Areal (Vigo)¹¹⁴. This research has been continued by multi-disciplinary teams from CSIC, who have recently studied stretches of the Galician coast, specifically the area of A Guarda

¹⁰⁸ LÓPEZ SAÉZ et al. 2018; LAGÓSTENA BARRIOS 2019; LAGÓSTENA BARRIOS 2021.

¹⁰⁹ DAVEAU, SIVAN 2010.

¹¹⁰ GARCÍA VARGAS, MARTÍNEZ MAGANTO 2017.

¹¹¹ ATIK 2008.

¹¹² BARON DE LOÉ, 1903-1904.

¹¹³ VALIENTE CÁNOVAS et al. 2014.

¹¹⁴ CASTRO 2006; CASTRO 2007; CASTRO 2008; CASTRO 2024, e.p.

(Pontevedra)¹¹⁵. In parallel, areas near Cádiz and Jaén have been reassessed to identify potential salt exploitation sites due to the limited evidence available¹¹⁶. Similarly, underwater archaeology has been employed to study the saltworks of the Adriatic coast, establishing a new framework for coastal salt exploitation studies¹¹⁷. These initiatives have been accompanied by environmental and territorial studies. Recent studies have favoured the formation of multi-disciplinary and inter-university working groups, effectively implementing new methodologies applied to various fields such as palaeoclimatology, dendrochronology, environmental studies, and underwater archaeology. These methodologies address aspects of open-pan salt production with *briquetage* and the study of coastal saltworks. Emerging projects include studies of salt-making sites on the Adriatic coasts and other initiatives focusing on inland salt production¹¹⁸. Another promising approach is archaeological experimentation, which has yielded significant results for the study of salt¹¹⁹.

This interdisciplinary approach extends beyond historical and archaeological research, incorporating aspects such as tourism to focus on societal impacts. Recently, there has been a concerted effort to combine academic research on ancient salt exploitation sites with a region's cultural heritage and legacy. A notable example is the Valle Salado de Añana, or "Salt Valley of Añana" (Basque Country)¹²⁰, which has gained international recognition through several prestigious heritage management awards¹²¹. The Añana saltworks have likely been in use since Neolithic times, with significant changes to the evaporation system occurring during the Roman period, shaping the landscape we see and admire today¹²². Since the turn of the century, intensive historical research and heritage conservation efforts have been undertaken. These

¹¹⁵ CURRÁS 2017; CURRÁS REFOJOS et al. 2024.

¹¹⁶ FORNELL-MUÑOZ, CASTILLO MARTÍNEZ 2019.

¹¹⁷ CARUSI 2018; BECHOR et al. 2020; GRISONIC 2022.

¹¹⁸ The group "Regards croisés sur le sel", made up of members of the French laboratory, Halma - UMR 8164 (CNRS, MCC, Lille 3), has been working on the history of salt since the year 2013, based on discoveries made in Northern Gaul, both archaeological and epigraphic, from Protohistory onwards. Its aim is to analyse salt production in the region from a "diachronic and transdisciplinary" perspective, including the natural sciences and geology.

¹¹⁹ Experimental archaeology may be a useful approach when it comes to reconstructing salt exploitation processes in Antiquity: BODI 2007; TENCARIU et al. 2015; HÖET-VAN CAUWENBERGHE et al. 2017, 20; HEES 2022.

¹²⁰ PLATA MONTERO 2008; PLATA MONTERO 2020. Excavations currently headed by Olivier Weller, within the framework of the research projects implemented by Casa de Velázquez and CNRS: Projet Néosal.

¹²¹ "Valle Salado de Añana" won the 2015 edition of the European Union Prize for Cultural Heritage-Europa Nostra Award 2015, a distinction granted by the European Commission and Europa Nostra for excellence in heritage management and landscape recovery, as well as a form of recognition of the salt production industry, which has a long tradition in the "Salt Valley".

¹²² Other examples include the Saline Royale at Arc-et-Senans in the French Jura region, or Salins-les-Bains, both historical saltworks recognised as World Heritage Sites by UNESCO, not to mention the salt mines of Wieliczka (Poland), also a UNESCO World Heritage Site.

efforts include the recovery, implementation, and exploitation of the site, demonstrating the dynamic nature of the ongoing historical and archaeological studies.

4. Conclusions

In this article, we have reviewed the history of salt in antiquity, starting with its early uses and ending with its full consolidation as a significant subject of study. Today, this line of research brings together experts from multiple disciplines, aligning with current research trends. Salt entered the historical record through periods with available written sources, which explains its delayed appearance in Western ancient history (except perhaps in the case of Italic Rome and its writers). In contrast, it saw significant development in the East, especially during the Lagid Period, due to the abundance of papyrological information. One characteristic of salt is its subtle presence in the archaeological record: it is a mineral found in a natural state, a soluble product, and a rock that is difficult to trace. Consequently, we have had to identify evidence through complementary industries and specific production techniques, such as open-pan salt-making, since the artificial solar method leaves hardly any trace and the spontaneous natural form blends with its environment, even though it must have been gathered and used, at least at a household level. Nevertheless, archaeology has provided the initial details that sparked widespread interest in the study of salt in antiquity and protohistory. This theme will continue to be relevant in scientific archaeology, provided we acknowledge the geographical asymmetry between certain territories in prehistory and those fully incorporated into historical records, as seen in the West and the East. Archaeology has been – and continues to be – an invaluable tool for understanding salt in antiquity through territorial studies in salt-producing areas. These studies encompass aspects such as the occupation of territory, production sites, techniques, availability, and the location of coastal and inland saltworks, as well as *briquetage* workshops. These elements reference both salt production and the transport and dissemination of salt.

In recent years, research has increasingly focused on local and regional studies. However, in line with current trends, several joint studies have also emerged. For example, the recent volume by Harding¹²³ provides a concise overview of salt production archaeology in the European-Mediterranean region, covering the period from the Neolithic to the Middle Ages. It discusses the various techniques employed, including ongoing aspects, and includes a chapter with texts, emphasizing the importance of viewing history as a whole. We can also highlight initiatives like those led by Alexianu and others, who have aimed to integrate anthropology into these studies¹²⁴. The history of salt in Antiquity remains a rich field of inquiry: new approaches to interpreting sources and collateral materials, along with ongoing contributions from archaeology, continue to revitalize this thematic discipline. A long road of discovery lies ahead, both in the East and the West.

¹²³ HARDING 2021.

¹²⁴ ALEXIANU et al. 2023.

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