



## THE HISTORY OF THE EXPLOITATION OF SALT DEPOSITS IN ROMANIA

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DOI: 10.2478/minrv-2026-0012

received – 06.03.2026 / revised – 23.03.2026

accepted – 03.06.2026 / published – 19.06.2026

**Abstract:** *This work presents useful, rich and well-structured information on the history of the exploitation of halite in Romania, throughout periods in the history of the Romanian people in the Carpathian-Danubian-Pontic space: Dacian, Daco-Roman, post-Roman, after the 10th century and up to the present. References are made to the salt trade in the European space and a brief review of the techniques and technologies of salt extraction. The work concludes with a nomination of the main saline, which worked on the territory of our country in different historical periods.*

**Keywords:** *history, salt, exploitation, Romania*

### 1. Introduction

The greatest riches of the Romanian subsoil are linked to events and geological formations of Neozoic age, influenced by Alpine tectonics, followed by deposits linked to pre-Hercynian and Hercynian tectonics (Palaeozoic and possibly Precambrian era), the fewest of the deposits known to date, being from the Mesozoic [1].

Of particular importance in the activity of extracting and valorising solid useful mineral substances, in the Carpathian-Danubian-Pontic space, salt enjoyed great importance, as it was necessary for human life and as a result had multiple uses.

Salt was extracted from the water of salty springs, from the water of salt lakes, from seawater, from salt massifs that sometimes appear on the surface or from the depths of the earth.

The exploitation of salt deposits is done on the surface of the surrounding land, in the so-called *quarries* and underground in *mines*, called *salt mines* (*ocne* in Romanian).

Salt mines, along with metal mines, have played an important role throughout history, in the life and development of population groups, as well as in the dynamics of societies.

Also, these concerns led to the development, in points of great interest, of industries, at first artisanal and then of an extensive nature, reaching the industrial giants of today.

Salt is used every day, but those who really know it know that it is both precious and dangerous. Salt is a source of conflict, trade, smuggling and import, as a result this mono-mineral rock deserves to be known as well as possible and by as many people as possible.

### 2. Man and salt

Man began to feel the need to use salt when he moved from a hunter's life to that of a farmer, when he switched to using cooked foods. Man and animals need salt daily. Salt became an important ingredient of human life when people's lives began to depend to a large extent on agriculture, animal husbandry, preserving products and processing leather. In all these activities, people needed significant quantities of salt.

As a result, history shows that the need for salt led to the displacement of some populations and that the emergence of populated centres is correlated with the presence and consumption of salt. Since salt is not found everywhere, populations have often moved to places where this mineral existed and could be easily exploited.

**One of Romania's greatest riches is salt** (fig.1). This useful mineral substance was discovered in the Neolithic and man first used it as an ingredient in food.

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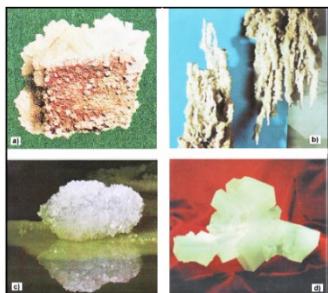


Fig. 1. Forms of salt presentation in nature  
a) massive sample of salt with crystals;  
b) salt samples in the form of stalactite and stalagmite;  
c) salt sample in the form of crystals;  
d) transparent salt crystals

### 3. Salt in documents

The oldest document mentioning salt is a Chinese chronicle from the beginning of the 3<sup>rd</sup> millennium BCE [2].

Another document, from the period 3000-2700 BCE, also of Chinese origin, describes the method of obtaining salt from seawater by boiling and, also, by boiling and evaporating the water left over from boiling ashes or even plants that grew in salty places, and the chronicles of the Chinese emperor Yu, from 2200 BCE, specified the salt taxes that his subjects had to pay.

Historians and scholars of the world, from all times, have expressed themselves regarding the importance of the presence of salt in human life.

Among the ancient historians and writers who wrote about salt, we mention Pliny the Elder, Herodotus, Dioscorides, etc. [2].

*Pliny the Elder* (24-79 CE- Roman historian, philosopher and writer; he died during the eruption of Vesuvius in 79) said that people cannot live without salt, this being an element necessary for their existence, the possession of saline sources often generating armed conflicts.

Along with water, earth and light, salt had a divine character for the Romans, being included in the form of a salty pie in religious ceremonies.

The ritual character of salt is lost in the mists of prehistoric times, but it continued over time because, for example, the wrestlers of the Japanese national sport "Sumo" still sprinkle the fighting podium with salt before matches today, invoking and honouring the gods. In addition, in the Egyptian recipe for "embalming" mummies, salt figured as an important element.

In 64 BCE the Greek doctor *Dioscorides* describes the process of obtaining salt by evaporating sea water, mentioning the islands of Cyprus, Sicily and Phrygia as suitable places for this working process.

*Herodotus* (484-425 BCE- Greek historian-father of history) reports the exploitation and use of salt and also mentions a series of lakes on the shores of which salt can be collected, things later reported by *Vitruvius* (sec. I BCE-architect; he wrote "On Architecture", the oldest preserved architectural treatise).

*Plato* (428-348 BCE- Greek philosopher, disciple of Socrates and master of Aristotle) says that salt is pleasant to the gods because it harmoniously develops the sense of taste. Thus, salt becomes the symbol of friendship, hospitality and fidelity.

*Aristotle* (384-322 BCE- Greek philosopher. The greatest thinker of antiquity) also speaks about the salt mines in Attica.

*Cato the Elder* (234-149 BCE- Roman writer and statesman) writes about the mines in Spain, as well as about the method of cutting salt into blocks and extracting them from the salt pans organized on the surface.

*Nicolae Iorga* (1871-1940- Romanian historian, statesman and writer), shows in his writings that the discovery and use of salt, which allows the preservation of meat and food in general, was one of the great events of prehistory.

In the geographical space of our country, salt has been extracted since prehistoric times, with archaeological evidence in this regard dating back to the Neolithic and continuing into the Bronze Age.

Some of the oldest archaeological traces of salt exploitation in the world have been discovered in Romania to this day. Of course, there are other countries that claim to have been the first, but the vestiges from Romania are internationally recognized as the most tangible and credible.

**The oldest evidence in the world** related to the exploitation of salt in Romania comes from three well-preserved sites located in sub-Carpathian Moldavia and Transylvania: **Lunca**, **Țolici** and **Băile Figa**, where interesting vestiges have been found, the oldest of which are 8,000 years old [3].

The dating of the deposits from these sites was based on the ceramic remains discovered on site. For example, research conducted at Lunca, a town in Neamț County, located 12km from the town of Tg. Neamț, led to the identification of vestiges, the oldest of which are dated to around 6050 BCE. Research at Lunca

began after 1980 and fragments of ceramic vessels from the Starcevo-Criș culture were found near some salt water springs. Here, people 8000 years ago specialized in obtaining solid salt from salt water by evaporation.

**Țolici** site - Neamț County was investigated through archaeological excavations after 2007 and burnt clay troughs resembling troughs were found, a lot of ceramics, and various objects used to obtain solid salt by evaporating salt water. The discoveries at Țolici cover two and a half millennia, more precisely the period 6000 - 3500 BCE [3].

The site of **Băile Figa**, located 13 km from Beclean, Bistrița-Năsăud County, was investigated after 1990, and the discoveries exceeded all imagination. The research carried out led to the conclusion that salt exploitation began in Figa around 1500 BCE, continued until 850 BCE, after which the activity ceased until 400 BCE. The research at Băile Figa brought to light the most consistent vestiges of industrial salt exploitation, dating back to the Bronze Age. Wooden installations from that time were found here, preserved almost intact, as well as numerous troughs, troughs, shovels, sledgehammers, wooden vessels and massive mining hammers made of stone.

After 15 years of assiduous research, the conclusion was that at Băile Figa there was a complex system of salt exploitation: everything was well thought out, the various elements of the installations were closely connected to each other and as a result it was a complex and large-scale production.

The discoveries made at the archaeological site of Băile Figa were catalogued by Prof. Anthony Harding from the University of Exeter (UK) and member of the British Academy, as a scientific sensation on a European level.

#### **4. Salt in Dacia before the Romans**

During the Dacian era, the exploitation of salt and stone quarries necessary for the large military constructions on the territory of Dacia continued, which came to light following archaeological excavations carried out in recent decades. Various tools used for extracting and processing salt have also been preserved from the Dacian period, some of which are at the National Museum of the Union in Alba-Iulia and in various other museums of regional or national interest in Romania.

Since salt appears on the surface in many regions throughout our country, its organized exploitation began in ancient Dacia long before the Roman conquest. In this sense, it should be noted that the Scythians traded in salt and salted fish on the territory of Dacia, a trade later taken over by the Greeks, and the Thracians transported salt from Dacia to the Balkan Peninsula.

#### **5. Salt in Dacia conquered by the Romans**

By conquering the Dacian territory by the Romans, the exploitation of mineral wealth on the occupied Dacia territory will be amplified to the level of the interests of the conquering state.

In support of these statements, various tools discovered in various localities in our country and which were used to extract and process salt by the Dacians, such as, for example, spades, shovels, hoes, levers, plead etc.

The conquest of Dacia by the Romans, under the leadership of Trajan, must also be linked to the natural riches of this territory, riches among which salt is listed at the forefront.

Traces of Roman salt pans have been found in Ocna Sibiu, Ocna Mureș, Cojocna, Ocna Dej, Sic, Domnești, Mărtiniș, Ocnele Mari, etc.

With the conquest of part of the territory of Dacia and its organization as a Roman province, in parallel with the exploitation of gold and silver deposits, the systematic extraction of salt was also developed, which, in addition to domestic consumption, was largely exported to other areas of the empire. The custom of extracting salt with common law convicts, which lasted until a few decades ago, is inherited from the Romans, as documents of the time say that Christians convicted for setting up their forbidden associations, "collegia illicita", worked in the salt mines. The old inscriptions on the monuments remaining from the period of Roman rule speak of the existence of a "collegium salinariorum" with headquarters in Turda.

When the Romans arrived, they raised salt exploitation to another level, traded in salt, built roads and camps near the deposits, and even drafted and enforced laws for the exploitation and valuation of salt. During Roman rule, over 40 salt mines operated in Transylvania. The word **salary** also remained with us from their time, because soldiers who worked in salt received a *salarium*, in pieces or lumps of salt, for their work. Salt from Transylvania supplied the populations north and south of the Danube. At that time, there was a great need for salt because it was used to prepare skins, preserve food, and feed people and animals. Salt also differentiated people into rich and poor. Only the rich had salt on their table. **Salt was considered the white gold of the ancient world.**

Although more direct observations are lacking, it is very possible that in the Roman era many other deposits were exploited in addition to the rich salt deposits at Ocna Sibiului, Ocnele Mari, Turda, etc.

All the settlements located near the salt mines flourished strongly from an economic point of view through the exploitation of salt. Compared to other salt extraction regions in Dacia, those in the Mureș valley were advantaged by the possibilities of transporting this mineral on the Mureș river to the Tisa and then further on the Danube to central Europe.

Given Dacia's large salt resources, we believe that in the Roman period a considerable production of this mineral indispensable to life was reached, which exceeded the internal needs of the province, also constituting an "export" product along with gold, wood and cattle.

The discovery of epigraphic monuments referring to the Roman conquerors' concern to exploit the salt riches in various regions of the Dacia province could be an indication of the scale of this "industry".

Traces of Roman salt mines have been found at: Ocna Sibiu, Ocna Mureș, Cojocna, Sic, Ocna Dej, Domnești, Mărtiniș, Ocnele Mari, etc.

The Romans also exploited salt along the Someș River at Mănăștur, Bata, Reteag, Ciceu, Cristur, Arpaș, Beclean, etc., localities where the salt was 3-4m deep, and in some places it even came out on the surface.

The exploitation and valuation of salt represented an important factor in the sedentary of population groups, forming human agglomerations around the places of salt extraction and trade. Some of these have disappeared, but the vestiges still exist, proving their extent and durability. The old salt deposits at Ocna Mureș, Ocna Dej and Praid, where Roman exploitations took place, are still in operation.

In those days, salt from Transylvania was transported by land in long convoys of wagons or by ship on the inland rivers Mureș, Olt, Criș, Tisa, by river on the Danube and by sea on the Black Sea through the port of Tomis.

## **6. Salt in the post-Roman period**

After the withdrawal of the legions from Dacia by Emperor Aurelian in 271, south of the Danube, the bulk of the rural population and part of the population of the cities of Dacia remained in place, with their main occupation being animal husbandry and land cultivation, but the activity of extracting and processing metal ores, salt and other useful minerals also continued. However, we must recognize and respect the historical truth that with the decline of the Roman Empire, there was also a sharp decrease in mining production both in the territory of the former empire and in the bordering territories, a situation that remained for several centuries.

In its entirety, the socio-economic life of the former Dacia-Trajan, reflects the features of a society with well-defined structures, capable of achieving an important agricultural and craft production, which, especially in the 4th century, required, in addition to barter, the use of currency in commercial exchanges.

In the period after the withdrawal of Roman rule from Dacia (275) and until the end of the 8th century, the territory of our country came under the domination of migratory peoples who did not support the maintenance and development of mining activity at all and as a result it gradually diminished.

During a period that lasted between 300-375, part of the territory of our homeland was under the domination of the Visigoths, the western branch of the Goths. The Visigoth invasion was followed by that of the Turanian Huns who came from the east between 375-453. During the domination of the Huns, the Ostrogoths also passed through our regions, the eastern branch of the Goths from whom it is admitted that we have the "Treasure of Pietroasa" called "The Hen with the golden chicks".

The Hunnic Empire was defeated in 454 by a coalition led by the Gepids who took over in their place, between 454-567.

During the years 567-800, the territory of our country, or parts of it, came first under the domination of the Avar tribes and later under the influence of the Bulgarians.

For the needs of the populations living in Transylvania and for those outside it, during the Gepids, 454-567, salt was more important than gold or other metals and this substance was certainly exploited almost without interruption throughout the entire period of the Gepids and Avars' rule of this area of Europe, 567-800. Proof of this is the numerous Avar-type graves discovered in the region of the main salt deposits at Turda and Ocna Mureș. These graves certainly belong to workers or supervisors in the salt mines.

In the second half of the 6th century, a wave of Slavic tribes settled among the natives of the villages in our country, starting with Moldova and then with south-eastern Transylvania. The vast majority of these tribes had already left our country, crossing the Danube with the collapse of the Danube border of the Byzantine Empire in 602-603 and colonizing the territory between the great river and the Balkan Mountains. In the 7th and 8th centuries, a second wave of Slavic tribes settled in the country, stronger and with a more advanced technique and organization than that of the first wave.

The fact that some mining operations from the Roman era are known at the end of the Middle Ages with typically Slavic names (Zlatna, Ruda), allows us to conclude that the Slavs, who temporarily settled in the territory of Dacia in the 6th century, exploited these mines with the help of the locals, changing their Roman names with Slavic names, which are still preserved today.

During the invasion of migratory peoples, the Daco-Romans on the territory of present-day Romania continued to live in more secluded places, safe from invaders.

Although the organized, systematic form of mining and metallurgical activity during Roman Dacia could not be continued to the same extent under the Goths, Huns and Gepids, etc., it never completely ceased, as evidenced by the great spread, over vast territories, of the discovered iron loaves as well as our respective terms, of Latin origin, which would otherwise have been lost.

Written documents regarding the general mining activity in our country at that time are very rare. The oldest attest that in the 9th century salt was exploited in Transylvania at Ocna Dejului. It was extracted using traditional techniques and transported on rafts on the Someș and Mureș rivers, being then sold in Moravia.

The clustering of settlements and cemeteries from the 7th-9th centuries around the salt pans or salt massifs at Ocna Dejului, Sic, Cojocna, Turda, Uioara, Sovata, Ocna de Sus, Ocnele Mari, Slănic, etc. is the most telling evidence that these salt mines were also exploited in those centuries. The same clustering of settlements is also found in the valleys rich in gold-bearing sands, from where, by washing, gold was extracted, which was then used to make various objects of adornment.

The Transylvanian Mountain areas where deposits of gold, silver, copper, lead, salt, etc. are located, are assumed to have been exploited in the 5th-9th centuries, the presence of moulds for casting various bronze objects, or the discovery of numerous lead, silver and bronze objects, processed or in the process of processing, are undeniable testimonies of the existence of stable workshops as well as itinerant craftsmen, who carried out their activity within the communities [3].

The continuity of the extraction of useful minerals absolutely indispensable to human life is assumed to have also existed in the case of salt exploitation.

Unfortunately, for the period between the 4th and 8th centuries, this exploitation of salt on the territory of our homeland cannot be proven due to the lack of documentary data; it can only be assumed that it was practiced in the old Roman salt mines (ocne): Cojocna, Turda, Ocna Mureșului, Sic, Ocna Dejului, Domnești, Homorod, Praid, Ocna Sibiului, Ocnele Mari. Salt was exploited and used for local human needs, but especially for animals, in an agrarian-pastoral society such as the autochthonous one. Without a doubt, salt was extracted in large quantities from the Dacian land and to take the road to the regions around Dacia, lacking this important raw material. It is likely that many Roman coins from that period arrived in Dacia in exchange for salt.

The first written news about salt extraction, in the period we are referring to, dates back to the 9th century; it is a text from 892, included in the *Annales Fuldenses* – a treaty of the German king Arnulf concluded with the Bulgarian khan, Vladimir. In that treaty, the condition was set that Vladimir would not allow the Moravians to buy salt that came from Northern Transylvania or from Maramures. From this information we learn that the Bulgarians took possession of part of the salt mines in Southern Transylvania (Ocna Sibiului, Ocna Mureș) and that they traded in salt. From here we also learn about the long-distance transport, since the 9th century, of salt from Maramures. Anonymus also mentions an exploitation of salt in Transylvania in his accounts: “From there <from Transylvania> salt and salty materials are extracted”.

When the Hungarians occupied Transylvania, they took over from the Bulgarians the salt mines opened in Southern Transylvania, which were in fact mostly smaller or larger quarries.

The exploitation of salt in the 6th-9th centuries on the territory of our homeland can also be supported by philological and linguistic means. For the era of Romano-Slavic symbiosis, there is evidence of the term *ocnă*, which derives from the Slavonic “AKNA”, as well as the name of the SOLNOC county in Transylvania, derived from the Slavonic “SOLNIC” (salt town). The local population exploited salt both to cover domestic needs and for export to neighbouring states lacking such a mineral.

Together with the evidence from the field of base metal extraction, the evidence of salt extraction, primarily on the territory of Transylvania, demonstrates that the inhabitants here, despite historical vicissitudes, remained in place after the 4th century. The occupations of extraction of useful minerals described above, which involve the acquisition, from generation to generation, of technological knowledge related to prospecting, exploration and exploitation of mining deposits, to the construction of ore reduction furnaces, to knowledge of the entire metallurgical process, prove the continuity of life of our ancestors on the same territory, on the same geographical space populated today by Romanians.

The persistent Roman tradition, the permanent ties with the Roman-Byzantine world left a strong imprint not only in the cultural-religious sphere, but also in the economic and technical fields of the Daco-Romans,

which created a certain superiority of them over the alien elements and over the neighbouring populations that did not live in the Roman Empire. Later, starting with the 5th century, the Roman traditions are lost, and the material culture as a whole is barbarized, throughout the North-Danubian space.

## 7. Salt after the 10<sup>th</sup> century

The exploitation of the subsoil resources of our homeland has generally experienced continuous progress since the 11th century.

In addition to those presented above, in the 10th-14th centuries salt continued to be exploited as one of the most important minerals. The customs tariff of Hainburg and Stein (Austria), drawn up towards the end of the 11th century, mentions salt coming from Transylvania.

In the first document known to date with reference to Transylvania, issued by the Hungarian chancellery in 1075, the customs of the salt mines at the fortress called Turda is mentioned. So, in 1075 salt was exploited in the salt mines at Turda and the **salt customs** of Turda was established for the first time.

From the 12th century AD there are a series of documents attesting to the exploitation of salt in Transylvania and Maramures. The documents specify the donations in salt made to various monasteries in Transylvania and abroad, the method of exploitation of this raw material, transportation by land or water, marketing and cost of the product.

In the following century, documents mention a series of salt exploitations and the marketing of the product on the domestic and foreign markets. It also shows the privilege granted to the Teutonic Knights in 1211 and reconfirmed in 1222, namely that they could own six ships for transporting salt on the Olt and Mureş rivers, as well as the salt mines necessary to supply these ships. They were exempt from any customs duties and had the right to export salt to Bulgaria, Greece and other countries.

In the first half of the 13<sup>th</sup> century, new areas of the salt deposit at Ocna Dejului were put into operation, and in the second half of the same century, the salt mines at Cojocna and Sic were opened.

At the beginning of the 14<sup>th</sup> century, salt was also exploited at Ocna Sibiului, and in Maramureş, salt was extracted from Rona and Şugatag. Ocna de la Rona is mentioned for the first time in 1191.

In Wallachia and Moldavia there is written evidence of the organized exploitation of salt from the 14th century. However, salt undoubtedly continued to be exploited for domestic needs throughout the early Middle Ages, extraction being facilitated by the fact that salt deposits were located on the surface of the soil both in the eastern area of the Eastern Carpathians and in the southern area of the Southern Carpathians.

The salt extracted from the territory of the Wallachia was in the 14th century an object of export, especially to the Byzantine Empire. The export was made from the ports of Cetatea Albă and Chilia on the Danube and most certainly the goods came from the salt mines at Tg.Ocna.

The exploitation of the subsoil wealth of our homeland has generally experienced continuous progress since the 12th century, except for moments when, due to adverse circumstances (the establishment of Ottoman rule), the exploitation of useful minerals was temporarily halted or reduced to meeting minimal needs.

At the beginning of the Middle Ages, a series of old mines and salt mines in Transylvania were reopened and new needs appeared in Moldavia and Wallachia, reflected in the emergence of salt pans in Grozeşti, Târgul Ocna, Slănic, Telega, Doftana, etc. The marine salt pans on the Black Sea coast were rebuilt. The name of the town of TUZLA, which means SĂRĂRIE in Turkish, remains a testament to this. In such a salt mines, there were fenced places where large boulders were placed that were sprinkled with seawater, which evaporated under the rays of the sun and in the wind, leaving salt on the stones, which was then shaved and gathered in piles and further delivered to consumers. The export of Romanian salt once again has a strong development. The first documents indicating the existence of salt mines in Transylvania and Maramures refer to Turda (1075), Rona and Ocna Şugatag (1191), Ocna Dej (1236), Cojocna (1291) and Ocna Sibiului (1326).

In Wallachia and Moldavia, documents mention the existence of salt mines at Tg. Ocna (1380), Ghişoara (1557). Undoubtedly, in all geographical areas, the mines were quite numerous, especially the small ones that extracted salt for local needs, not for exchange.

Salt mining continued in the 15<sup>th</sup>-16<sup>th</sup> centuries in the same places where it was extracted in the previous era. Alongside these old salt mines, new ones were opened at that time, and mining gained momentum especially in Moldavia and Wallachia due to the central authority taking over the coordination of the mining process. The documents attesting to these activities are very numerous, especially for the territories of Transylvania and Maramureş. Based on them, we can get a fairly complete picture of the salt mining process on the territory of Romania. Thus, the most important salt mines in Transylvania at this time were those in Turda, Dej, Sic, Cojocna and Ocna Sibiului, and in Maramures, Rona (today Coştiui) and Şugatag, as well as other mines near the localities of Visc, Hust, Ticeu, etc.

From some writings of Gheorgh Raicherstorffer, secretary and advisor to the Hungarian crown around 1527, we learn about the salt mines at Ocna Sibiului, from which an immense treasure is collected every year.

About Mureș, it is shown that *at the present moment, boulders of salt are transported to Hungary on it.*

From some letters written in 1520 by Francesco Massano, former secretary to some high Venetian officials in Buda, we also learn interesting things about Transylvania. The author shows that: *first of all there are mountains of the whitest salt and just as the other mountains are of massive rock, so too are these of massive salt. This salt is consumed everywhere in this country and it cracks in the fire and does not melt in water unless it has been well crushed by crushing or grinding and surpasses the most precious sugar by its white colour.*

Unlike the Transylvania area, where the salt mines were exploited through leasing, in Wallachia and Moldavia the state directly managed the administration of the salt mines, generating significant revenues.

It is worth emphasizing that, throughout history, salt has been a source of wealth and great income for all the rulers and leaders of the regions in the current territory of Romania.

King Matthias Corvinus confirmed in 1463 *“the right to free exploitation and trade of salt for the Szekler”*. In return, the Transylvanian salt mines provided King Matthias with an income of 100,000 gold florins per year.

Documents from that time provide us with important data on the configuration of the salt mines in Transylvania. The salt mine at Turda, called the Old Mine or the Great Mine, was about 45m deep and about 18m wide on one side, and only about 5m wide on the other. The Small Mine was about 15m deep and about 9m wide. The salt here was good and hard.

There were two salt mines in Dej, one in the town of Dej, and the other right at Ocna Dejului.

At Ocna Sibiului, the salt mines were located on the nearby hill. There were two, called “Ocna Mare” and “Ocna Mică”.

In Wallachia, the salt mines at Ocnele Mari (1408), Ocnele Mici (1517), Telega (1563), Ghițioara (1557) are known, and in Moldavia, the salt mine at Trotuș (1470) operated in the 15th-16th centuries.

On March 13, 1373, Louis, the king of Hungary, stopped the import of salt from Wallachia. The fortress of Giurgiu had been built by Mircea the Elder and, as his son, Vlad Dracul, testified, *“there was not a stone in this castle that did not cost <his father> a boulder of salt that was extracted from the rocks in Wallachia”*. Between 1408 and 1418, Ocnele Mari (Vâlcea) was mentioned. In 1517, the operation of a new salt mine is attested, namely Ocna Mică near Târgoviște. It seems that this mine was opened during the time of Radu cel Mare. It is possible that the mine from Telega (Prahova), mentioned in documents for the first time on April 14, 1563, was also opened at that time.

Alongside these salt mines, which were exploited in an organised manner by the central authority through its officials, salt was also extracted for the consumption needs of the population by the inhabitants of the villages within whose radius there were deposits located close to the surface or which even emerged. Anton Veranicici (16th century), speaking about Transylvania, showed that *“the whole of Transylvania is built on salt to such an extent that in many places on the Mureș River the banks dug in salt rise, and the Szeklers extract it in their own country from a palm and a half of the dug earth”*.

More complete data on salt production is lacking. It is known, however, that in 1551-1552 the salt pans in Maramureș produced annually about 975,000 pieces of salt, which represented an income of 8,000 - 10,000 florins [4].

At the head of the administration of salt exploitation was a committee of the pantry (*comes camerae salium*) appointed by the king. He was responsible for the exploitation and sale of salt, having judicial powers on the territory of the pantry. Under his authority were the vice-cambers who took care of the pantry materials, those who kept the records (*rationistae*), the clerks (*officinales*), those who made the payments to the workers, the cooks, the gardeners, the salt boulder counters (*magulatores*), the priests, etc. All were paid in money and in kind.

The salt was stored in certain scaffolding- centers, from where it was transported on land or water using carts or boats. Those who built and drove the boats (rafts) loaded with salt were called in Latin *celeristae* (up to 20,000 boulders could be transported on a raft) [3].

In 1536 Hans Dernschwam elaborated the “Report on the exploitation of the salt mines in Transylvania” in which it was shown that the salt mines were bell-shaped, each with three shafts: one for extraction with a horse-powered winch, a second with stairs for personnel, and a third with a manual winch through which the copper boiler with fire was lowered to activate the aeration. He indicates for the 16th century the exploitation of the salt mines of Turda, Sic, Cojocna, Ocna Dej and Ocna Sibiului. In 1551, so only after 15 years, in order to know the exact situation of the salt mines, the royal house sent two commissioners to inspect the mines in

Transylvania. The royal commissioners Paulus Bornemisza and Georgius Werhner, in the report drawn up in the spring of 1552, make references to the quality of the salt, the exploitation methods applied, the number and type of works used. In the same document, the Turda prison is declared to be the most important in Transylvania.

Beyond the Carpathian Mountains, the salt mines of Târgoviște, Telega, Râmnic and Tg. Trotuș operated. In the following century, the Slănic salt mine was also opened, to supplement production for the export of salt to Turkey. Exploitation continued in all the salt mines using the old method. Extraction was done manually until the 19th century, with a hammer and chisel, or with wooden or metal wedges to remove blocks of the required dimensions for export. The fine salt was removed to the dump.

Some interesting data also exists regarding the salt extraction technique. Several categories of people specialized in different jobs participated in the salt extraction operation. The cutting of salt blocks from the salt mine was done by *the cutters*. The salt was transported to the surface using an installation (crivac) that operated on the principle of a pulley. Animal power was used. This explains the maintenance of several horses near the mine. These “machines” were serviced by *rotaries*. The machine was powered by eight horses and extracted several oxbags full of salt at once.

For the repair of tools and the manufacture of metal parts, there were *blacksmiths* with apprentices and *coal miners* near each mine.

After the Battle of Mohács (1526), for a long time, only small local entrepreneurs continued to exploit salt mines in Transylvania. At that time, salt from Transylvania competed with that extracted in the mines of Wieliczka near Krakow in Poland /49/.

In Transylvania, rock salt formed one of the most important mineral treasures of the Szekler lands and from ancient times, the salt from this area constituted the wealth of the Szekler community. By virtue of this right, each household was supplied with salt free of charge, until 1562 when King Sigismund of Luxembourg ordered the confiscation of this right. According to this decision, the income resulting from the exploitation and marketing of salt belonged to the state treasury.

The Szekler exploited salt in quarries and sold it quite cheaply to the neighbouring Saxons. The quarries of those times were more or less regular excavations, of small depths, from where the cut blocks of salt were transported behind the miners, to the surface of the surrounding land, or they formed a living chain and passed the blocks from hand to hand. Sometimes the transport was also done with the help of sledges pulled by people or horses. Water infiltrations were stopped with buffalo skins, which are very resistant to the action of brine. The buffalo was and still is today the favourite animal of the mining areas and salt mines. Until the end of the 19th century, apart from the iron pickaxe, almost all tools were made of wood. In the middle of the 20th century, iron tools became widespread, which proved to be particularly useful and productive in the exploitation of salt.

The process of salt exploitation began in the fall and lasted for 5-6 months. From spring to autumn, the miners went about their peasant occupations: they worked the land, took care of the animals, on Sundays they went to church and had fun. Salt from Transylvania was exported to Poland, Holland, Belgium, Venice and the Ottoman Empire. The trade routes existing in the second half of the 17th century prove the value of salt at that time, in addition to other exchange goods such as wood, mercury, cloth, etc. A good part of the salt was transported to Wallachia and Moldavia, through the Bran Pass and the Predeal and Oituz passes. Towards the end of the century, the salt mines in operation were: Ocna Șugatag, Ocna Dej, Sic, Ocna Turda, Ocna Mureș, Ocna Sibiului, Coștiui and Praid.

In general, the mines were, as in other parts, leased or operated by management with the help of free or enslaved workers. In Transylvania, these miners came from all existing ethnic categories, a special role being played by the Romanian element. Romanian miners came from numerous Romanian villages, the exploitation of the mines was based, first of all, on the work of these people, who had been practicing this profession for centuries. Hungarian or German miners worked alongside them, brought especially to exploit the riches of the Transylvanian subsoil in exchange for remuneration. Salt cutters, for example, were hired annually. In addition to them, other cutters called foreigners could also be hired to cut the salt, who worked whenever they wanted. The work of the miners, including those in the salt exploitation, was carried out under very difficult conditions. The work of the salt cutters was more exhausting and poorly paid.

In the 17th-18th centuries, in addition to the old salt mines in Transylvania and Maramures at Turda, Cojocna, Ocna Dej, Ocna Sibiui, Rona, Ocna Șugatag, other salt mines such as those at Praid, Vișeu, Câmpulung pe Tisa, etc., came into operation. The state no longer leased out the exploitations and took over all of them under administration.

In Wallachia, the exploitations at Ocnele Mari, Ocnele Mici, Ghițioara and Telega are still active. During the reign of Șerban Cantacuzino, the salt mine at Teișani was opened, and during the reign of Constantin Brâncoveanu, the one at Săraru. In 1685, the salt mine at Slănic Prahova on the estate of the backman Mihai Cantacuzino also came into operation.

The most important salt mines in Moldova were those at Troțuș and Tg.Ocna. Systematic salt exploitation was also practiced in Grozești (Bacău County), Ibănești (Botoșani County) and in various places in the Vrancea and Buzău areas.

Towards the end of the 18<sup>th</sup> century, 100,000 tons of salt were produced annually in Transylvania from the salt pans of Turda, Cojocna, Ocna Dej, Ocna Sibiu, Sic and Praid.

The production of Wallachia was mainly carried out from the Slănic Prahova salt pan (8,000 t/year), less from Ocnele Mari, and a little and intermittently from Telega. In Moldavia, at Tg. Ocna, approximately 13,000 tons of salt were produced annually.

A large quantity of salt, which exceeded the requirements of internal consumption, was sold on the Hungarian market or the countries of the Balkan Peninsula. The quantity of salt extracted increased especially at the end of the 17<sup>th</sup> century, when a provision from 1695 required the adoption of the custom of cutting the salt “into daily salt and Saturday salt” at the salt pans of Turda, Cojocna, Sic and Dej; The daily salt was to be taken from the cutters for 25 dinars, and the Saturday salt for 10 dinars. Great exemptions were also provided for the cutters.

In Wallachia, at the end of the 16<sup>th</sup> century, there were four mines operating that continued to be exploited until the end of the 17<sup>th</sup> century. The mine at Rîmnic or Ocnele Mari (Vel Ocna), Ocna Mică near Tîrgoviște (Mal Ocna) and two mines opened in the second half of the 17<sup>th</sup> century, the one at Telega and the one at Ghițioara. Being an appreciable source of income, the lords of Wallachia intervened more often in the second half of the 17<sup>th</sup> century, buying up salt lands and opening new mines.

During the following century, the number of mines in Wallachia remained stationary for a while, then began to decrease. The measure to close some of them was taken by C. Brâncoveanu himself between 1705 and 1714. The reason was the abundance of salt which led to a decrease in its price and therefore to a decrease in the lord's income.

In Moldova, documents attest to the exploitation of salt in the 17<sup>th</sup> century in various localities in the mountain region; in some of these localities, for example in Grozești, Bacău region, the salt was found on the surface, being exploited directly, without the need for underground galleries. According to the accounts of a Swedish traveller from the early 18<sup>th</sup> century (1709-1714), salt horizons on the surface were also found in the surroundings of Focșani. One of the richest localities in salt was Troțuș. The foreign traveller Pietro Deodato, speaking of Troțuș, says that “*nature has endowed it with the most necessary material ... because around this city there are salt pans from which salt is extracted in such large quantities that it is sent throughout Moldova and to Russia, but also to other countries. Salt is also transported on the Danube and the Black Sea to Constantinople*”.

Regarding the exploitation of the salt mines at Tg.Ocna, it can be shown that until the middle of the 17<sup>th</sup> century, there were only 300 workers' houses in this locality. The market developed after 1650, as a result of the intensification of the exploitation of the salt mines, and towards the end of the century we find a town-type settlement here. On February 17<sup>th</sup>, 1690, the existence of officials such as a county magistrate, a grammarian, a clerk, and the presence of merchants and painters is mentioned here. The seal of the market represents a man holding a hammer in each hand.

From a document dated August 4, 1670, we learn that salt was also exploited from the Hîrlău hills, especially by the inhabitants of the nearby villages.

Robert Bargrave mentions “petrified” salt mines in the vicinity of the village of Ibănești (Botoșani County). He shows how salt was extracted from those and other nearby areas and exported to Turkey. “*It is cut into pieces of two or three feet. In pieces it looks black, somewhat damp, but when ground it is by far the best I have ever seen or tasted.*”

There was another form of salt exploitation, namely the popular one, which represented the oldest method. The inhabitants of the villages, near which the salt mines were located, had the right to cut salt for the needs of their homes in exchange for a contribution called “sărărit” or “solărit”. This right was enjoyed by the inhabitants of the old counties of Buzău, Rîmnicul Sărat, Neamț, etc., where the salt was found on the surface, forming the so-called “salt banks”.

## 8. Salt today

Of the many salt deposits that our country has, only seven are currently in operation, fig.2.



Fig. 2. Salt mines in operation today

In the *Pre-Carpathian Depression*, four deposits are currently being exploited, namely: Cacica, Tg. Ocna, Slănic Prahova and Ocnele Mari.

In the same area, there are 7 deposits whose reserves have been approved. Of these, at the Tuta-Varnița and Poiana-Vărbilău deposits, reserves of categories C<sub>1</sub> and C<sub>2</sub> were calculated, but these were not classified into groups.

Another category of deposits is formed by those whose reserves fall entirely into the off-balance sheet group, such as: Cucuieți-Moinești, Galean-Tg. Ocna,

Manzolești-Lopătari and Ursoaia-Viperești. The geological reserves at these deposits have the degree of knowledge corresponding to categories C<sub>1</sub> and C<sub>2</sub>.

The only deposit in the Pre-Carpathian Depression that has approved geological reserves in the balance group and is not yet in exploitation is the Băicoi deposit, located in the eastern part of the Moreni-Băicoi anticline structure and being well-defined especially due to the drillings dug for oil (70 drillings intercepted the salt formation), as well as due to the 4 deep drillings executed in the west of the massif with the aim of preparing a unit for the exploitation of salt by dissolution.

In the *Transylvanian Depression* there are over 80 salt deposits, of which three are in exploitation, namely: Ocna Mureș, Praid and Ocna Dej. In the Transylvanian Depression there are six deposits with activity ceased in the last century, but which have approved geological reserves. Of these, the Mercheasa and Mărtiniș deposits have reserves not classified in groups.

A special situation is represented by the deposits in Turda, namely Turda-Băi, Turda-Valea Florilor and Turda-Valea Sărată.

The Turda Băi deposit, although with an important salt reserve, cannot be the subject of any possible exploitation because the surface area is of particular tourist importance.

In the *Maramureș Depression*, they are found at various depths reaching up to 1,400m. Three very important deposits have been identified in this region with a geological reserve estimated at ten billion tons. In the Vadul Izei-Oncești-Hărniciești area, salt extraction by dissolution using boreholes is possible. The presence of salt in the region is also indicated by the large number of salty springs called by the locals "slatină" or, for example, "sărata" in parts of the border of certain localities.

Through the prospecting and exploration works carried out in the country, in recent decades, new important salt deposits have also been highlighted. Thus, new salt deposits were discovered at Slătioarele, near Pitești; Sărata and Gura Slănic, Bacău County; Mercheașa-Baraolt, Brașov County; Urzicaru, Argeș County; Nereș-Dej and at Rușăvă, Prahova County.

## 9. Salt Marketing

The massive transport of salt, within the country, on waterways lasted from the Dacian-Roman periods until the 19th century when the construction and transport of goods by railway was massively developed.

Salt exports were directed mainly, then as later, to the countries and cities of the Balkan Peninsula and to the large cities of Central Europe. Documents of the time speak of the so-called "via salaria", from Roman times, and later of the "salt roads", on which caravans transported salt from the mines to the border, to supply the surrounding countries. Salt was transported to Adrianople, Constantinople, Budapest, Leipzig and to the countries from the Adriatic Sea [6].

The obligation to transport salt fell to the poor population, who were very poorly paid for this activity.

From the entire production extracted from the salt mines of Dacia, significant quantities of salt were exported across the Danube, to Lower Moesia. The salt mines of Transylvania were the property of the emperor, who exploited them by leasing them. The leasing of the salt mines was done together with the pastures around them. In some cases, only the salt mines were leased, not the pastures. The lessees, together with the exploitation of the salt, also received the right to market this product.

The most important watercourse in Transylvania used over time and for the transport of salt was the Mureş River. For centuries, the Mureş was a means of communication and transport. The inhabitants of the villages on the riverbank were obliged to maintain the river so that it was permanently navigable, fig 3.

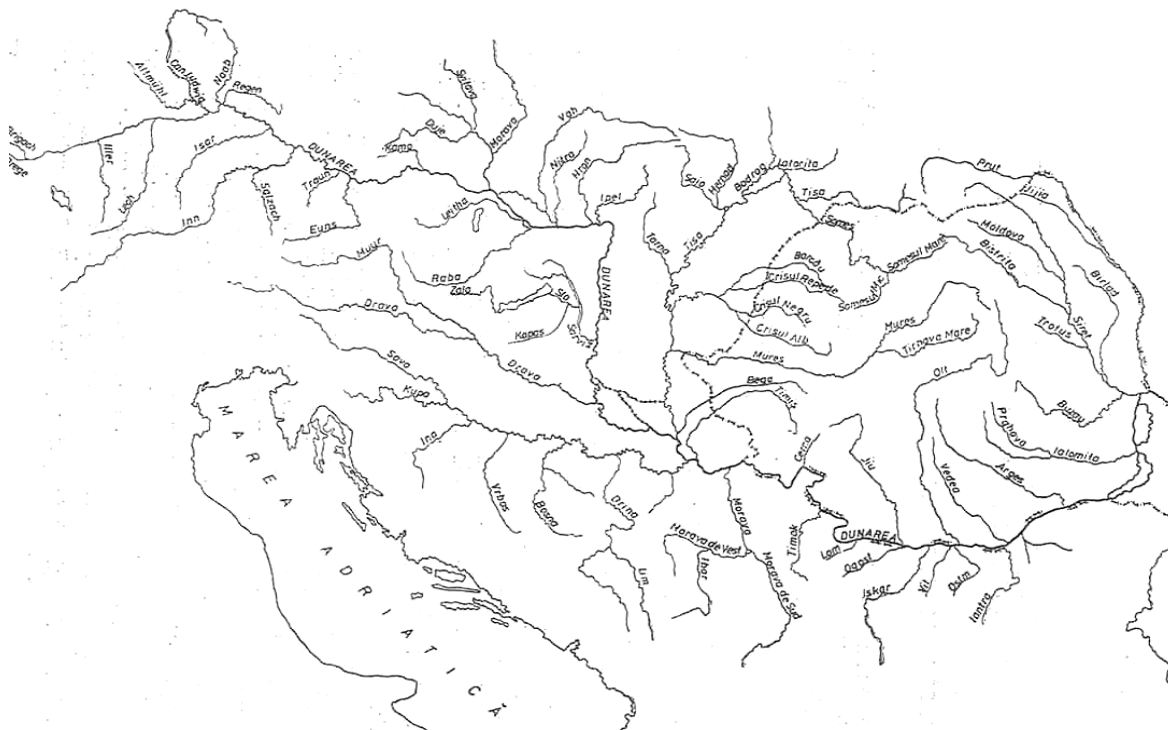


Fig. 3. The Danube River Basin and the Rivers on Which Salt Was Transported to Central and Southern European Countries [6]

According to historians, the first evidence, recorded in contemporary documents, of rafting on the Mureş River dates back to the 13<sup>th</sup> century, and the most valuable cargo transported was salt, an important food for both humans and animals, which was abundant in Transylvania. As for rafts, the documents attest to the existence of two types: some built of beams and planks, and others in the shape of a boat. A series of inscriptions, seals (fig.4) and documents attest to the existence of associations of shipbuilders on the Mureş River [1].



Fig. 4. The ship on the 1851 seal of the Hunedoara town of Cigmău attests to the existence of the rafters' guild [1]

Salt was mined in Ocna Mureş and Ocna Sibiu, from where it was transported to the Partoş port in Alba Iulia, a port organized by the Romans in the Mureş valley. In the Partoş port, the salt was loaded into barrels and transported by shipmen down the Mureş, to Szeged in Hungary. When the river flow allowed it, the shipmen loaded the barrels with salt right from Ocna Mureş. On their way to Pannonia, the rafters also supplied all the Transylvanian settlements located on the river banks, since each village had a certain quota of salt, depending on the number of animals in the households.

According to the documents, the sailors were recruited from among the inhabitants of the villages on the banks of the Mureş River and were exempted from the duties of serfdom. In Hunedoara County, there were, over time, about 70 raft men who were recruited from Deva, Geoagiu, Gelmar, Cigmău, Folt, Şoimuş, Brănişca, Burjuc, etc. The recruitment of the sailors was based on conventions that the Government (the organizer of the salt transport) concluded with the nobles. The documents also attest to the existence of a Salt Prefecture, led by the Salt Prefect and located in Partoş-Alba Iulia. The Prefect had an assistant in each county - a magistrate. Every year, a census of the sailors took place, and a special commission, which included the master, met periodically to resolve disputes between the sailors and the nobles, or to discuss the cases of sailors who neglected their duties.

Salt transports (fig.5) were more intense in spring and autumn. In summer they were hindered by the low water flow, and on the other hand the rafters had various concerns such as cultivating the land and raising animals, which they had to pay for.

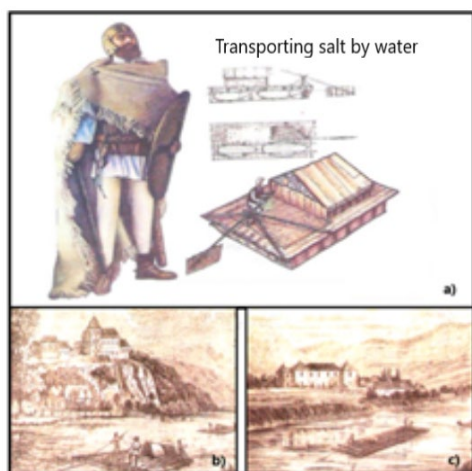


Fig. 5. Water transport of salt in different historical periods  
a) Daco-Roman period; b) and c) 19th century [1]

Salt transport on the Mureș began to decline with the advent of the railways. The Hunedoara boatmen gave up rafting around 1870, when the Arad - Alba Iulia railway was put into use. Since then, rafting has survived only in children's games or in the passions of young people.

At Micia on the Mureș there was a large port, where salt was stored and customs cleared, which was transported by water to Pannonia, Upper Moesia and the rest of the empire. The salt pans near the Mureș had scaffolding on the riverbank for storing, loading and shipping salt downstream, on rafts or in small boats. The most important port on the Mureș River was that of Alba-Iulia, which of course also served for the loading of salt brought

from the most important salt pans of Dacia.

Most of the salt mined in Transylvania primarily satisfied the internal needs of the province.

At Ocna Mureș, an important settlement was founded at that time, linked to the exploitation of the rich salt deposits, which has continued to this day.

In the salt mines of Ocna Mureș, coins, tools, and stamps of Roman-made vessels have been discovered. Archaeologically, in addition to Ocna Mureșului, Domnești and Sânpaul, traces of salt exploitation have also been found in Rognă, Ocna Dejului, Sic, Cojocna, Rupea, etc. For logical reasons, it can also be assumed that salt was exploited in the Bronze Age and even earlier, although so far we have little evidence in this regard. At the transition to the Iron Age, a strong orientation towards pastoralism is observed in the economy, which led to the intensification of salt exploitation.

Large quantities of salt were extracted from Turda. Here, in 1796, inscriptions regarding the exploitation of salt from this salt mine were discovered. Later, salt exploitation was expanded to Maramureș at Dragomirești, Ocna Șugatag, etc., where over time, various working tools, potsherds, coins, etc. were discovered.

The historical and archaeological data we currently have show that, in addition to iron, other useful minerals were also exploited in the second half of the 1st millennium, such as copper, lead, gold, silver and especially salt in Transylvania. Of the over 200 salt massifs existing on Romanian territory, many were exploited on the surface for several centuries, ensuring not only domestic needs, but also export. Thus, salt was transported on well-known roads to the Tisza Plain or to the Balkans, and in exchange for it various imported products were brought.

The grouping of settlements and cemeteries from the 7<sup>th</sup>-9<sup>th</sup> centuries around the salt mines or salt massifs at Ocna Dejului, Sic, Cojocna, Turda, Uioara, Sovata, Ocna de Sus, Ocnele Mari, Slănic, etc. is the most telling evidence that these salt pans were also exploited in those centuries. The same concentration of settlements is also found in valleys rich in gold-bearing sands, from where, by washing, gold was extracted and then used to make various objects of adornment.

## 10. Salt extraction techniques

The more numerous and richer news from the 17<sup>th</sup> century allows us to refer, to some extent, to the salt extraction technique. Paul of Aleppo, for example, reports that *“the work in the mines is very hard ... The method of cutting salt is done with great labour. They (the workers) dig about 9-10m deep until they find salt ... At night this mineral is cut, and during the day they bring it to the surface. Each piece is a large stone, weighing about two to three hundred oca. These boulders are dragged by workers with the help of long ropes pulled by horses”*.

The exploitation of salt, which was found in the basement of our country in inestimable quantities, was done in **underground chambers in the shape of a bell** (fig.6), with a maximum depth of 80–100m and a diameter on the inside of 50–80m. The rooms were located next to each other, separated from each other by protective or safety pillars.

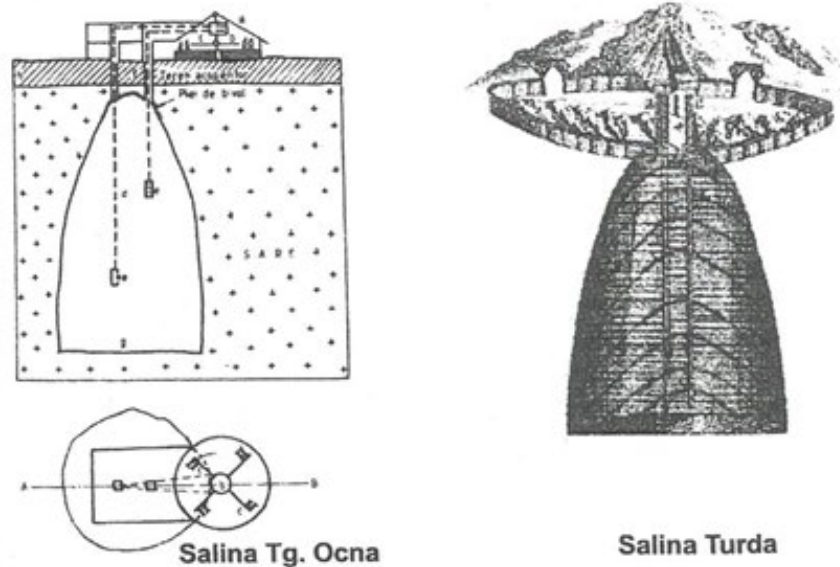


Fig. 6. Salt mining in bell-shaped chambers [3]

The exploitation was done from top to bottom, with slices of the sole, and the detachment from the massif was done through rectangular “furrows” outlined by 30-40cm deep trenches, dug manually with the help of hammers. “Pens” were inserted into these trenches which, when struck with sledgehammers, caused the salt to detach in the form of slabs. The slabs were broken into blocks of approximately 50kg and extracted to the surface using an installation called a **crivac** (fig.7).

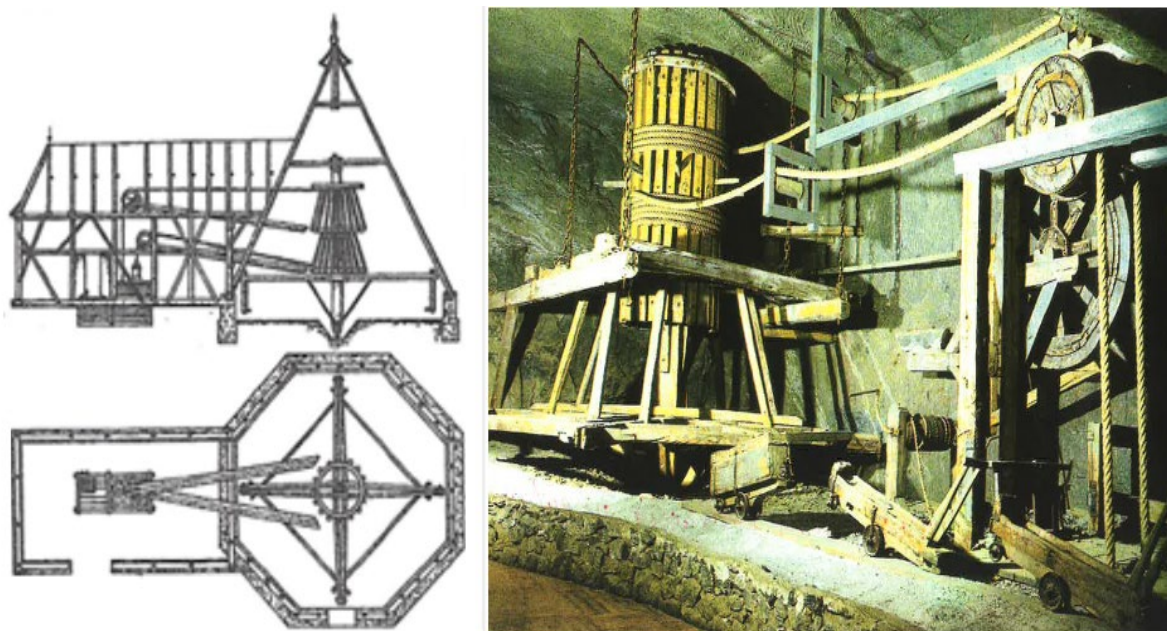


Fig. 7. Horse-powered crivac to transport salt to the surface [3]

**The crivac** consisted of a cylindrical wooden drum with a vertical axis, which was set in motion by animal force. A thick rope fixed to this drum made one end wind up and the other unwind. In this way, when one end of the rope descended into the salt mine, the other removed full bags or the block of salt from the underground.

The lighting of the workplace in the salt mine was achieved with a lampshade, and ventilation was achieved through diffusion.

Bell-shaped mining can still be seen today at the Slănic Prahova, Tg. Ocna and Turda salt pans.

The method of underground bell-shaped chambers was replaced by **the method of mining with large trapezoidal-rectangular chambers** (fig. 8), which by the end of the 18th century was generalized to all salt pans in Transylvania. The chambers were 50-60m high and 45-50m wide. The mining was carried out in horizontal slices delimited by trenches made with a chisel and hammer, and the separation at the base was done

with wooden wedges and later with iron wedges. This mining method led to improved aeration conditions and increased the extraction and removal capacity of the production, thus substantially increasing the salt production.

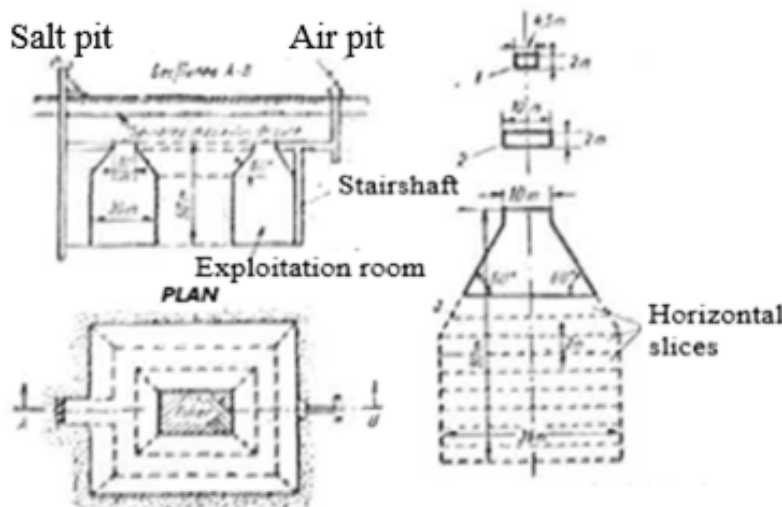


Fig. 8. Mining method with large trapezoidal-rectangular chambers  
1-drawing gallery; 2-widening of the drawing gallery; 3-exploitation in horizontal slices [1]

If in the years 1720-1729 9,858,000kg of salt were extracted annually in Maramureș, in the period 1731-1751, the quantity of salt obtained here amounted to about 16,000,000kg, so that in 1791 the production reached 47,453,884kg. Starting from 1845 the method was also applied to the salt pans in Wallachia and only in 1870 the method was assimilated to the Tg. Ocna Salt Pan in Moldova.

In Wallachia, the salt mines, a privilege of the “kingdom”, appear in charters since the time of Mircea the Elder, and in Moldavia the mention of the salt mines in documents also appears early. The monopoly of the rulers limited the production, however, in order to maintain the high price, as shown in “Description of Moldavia” by Dimitrie Cantemir. “*And in other places many veins of salt of this kind are found; however, the voivodes did not allow them to be opened, lest, due to the abundance, the price of salt decrease*”. As a result, the peasants were often forced to extract the salt from springs or from salt lakes by boiling and evaporating the liquid. The labour used in mining was constituted by the peasants, generally enslaved, and free people.

In the field of salt extraction, the cutting of the boulders was done by *salt cutters* or *ciocănași*, as they were also called in Wallachia, recruited either from among free people or from among the enslaved gypsies, who led a real life of hard labour. The yield of a salt cutter reached up to ten boulders daily. It was only in 1937 that the hammering machine was introduced in our country and in this way the productivity of labour increased from a maximum of 1.5 tons per *ciocănași*, to about 25 tons.

In the second half of the 17th century, the payment for a cut boulder of salt was 4 bani. In the case of the gypsy cutters from Ocnele Mari (princely exploitation), the work done was also paid.

Another category of workers used in the exploitation of the salt mines were the *maglași*, workers without any specific qualifications. They removed the salt boulders from the mine and piled them (“Magle”) at the mouth of the mine, from where they then transported them with their own cattle to the storage site. The *maglași* came to the mine weekly, in rotation. Their work was free. Each family was given a cartload of fine salt annually. They benefited from some customs exemptions and from performing some hard labor.

Along with *cutters* and *maglași*, other social categories of people also participated in the mines, such as: blacksmiths, carpenters, candlemakers, weighers, cellarers, sameși (cashiers), customs officers, grammarians or salt writers, couriers for correspondence, gurari (those who supervised the functioning of the crivaces), *bătăturași* (those who collected the fine salt from the bottom of the mine), guards, etc.

The entire staff at the mines was under the leadership of the treasurer who was the representative of the lord, appointed by the lord for one year. He had an assistant, equivalent to the *vicecămăraș* or *second cămăraș*. The *cămăraș* took care of the lord's entire income and had the right to judge the workers at the mines. The remuneration of all staff was made in money and in kind (food, clothing, etc.).

Work in the mines and salines (ocne) was carried out in very difficult and dangerous conditions, because the owners did not take all the necessary measures to ensure the safety of the workers. The galleries were insufficiently armed, constantly threatening to collapse, and the gases emitted also endangered the lives of the miners. The medical service was poorly organized, and in most places it was completely absent.

Salt continued to be exploited during the era of the collapse of feudalism, largely from the old mines, to which new ones were added, few in fact, opened at that time.

In 1780, there were six mining offices in Transylvania for the exploitation of salt, namely: Turda, Cojocna, Ocna Dejului, Ocna Sibiului, Sic and Praid. The exploitation at Sic was exhausted, only a reserve mine was maintained for unfavorable situations that might arise at the neighbouring mining offices. The Cojocna salt mine had a single shaft with a depth of about 80m; in 1772 it delivered about 144 boulders of salt. The Turda salt mine had five main shafts where, on average, about 60 diggers worked, with about 50 helpers; by 1777 it had a production of 145,000 boulders. The salt at Turda was very clean and had multiple uses. It was exploited by manual cutting in bell-shaped chambers and later in large trapezoidal-rectangular chambers.

The Turda Salt Mine operated until 1932, when it was closed due to competition and the low quality of production.

Ocna Sibiului, although it had two mines, barely produced, at about the same time, 120,000 salt boulders, due to the difficulties of transport and evacuation of flood water. In Praid there were two mines by 1800.

Salt continued to constitute a royal right. No one had the right to exploit salt for its commercialization. According to assessments, the commercialized salt production of the Transylvanian salt mines amounted annually to approximately 1,000,000 quintals (q).

In Moldavia and Wallachia, salt exploitation continued during the era of the breakup of feudalism in the main salt-producing centres: Slănic (Prahova), Ocnele Mari (Rm. Vâlcea) and Tg Ocna (Bacău).

Interesting data for Ocna Slănic (Prahova) is provided by Fr. Sulzer, in the work written on the occasion of his visit to Wallachia. According to him, the Slănic salt mine was the most important salt mine in Wallachia at that time, having a depth of about 60m.

Since the second half of the 18th century, another mine for the exploitation of salt was planned in the region known as Baia Baciului, located on the western slope of the Slănic Valley. Here, the salt deposit was also close to the surface, even coming out to the surface in some places. The mine, located right inside the salt rock, is believed to have been opened after 1700. In the first half of the 19th century, two other mines, also bell-shaped, were opened on the land of the current salt mine. These mines were known as Ocna Veche din Deal and Ocna Veche din Vale.

In the second half of the 18th century, the Slănic mine produced about 8,000 tons of salt annually, which were exported along the Danube to Constantinople and to the Black Sea ports on the coast of Asia Minor. Besides Slănic, Ocnele Mari and even Telega were open for a while; however, the largest production came from the Slănic mines.

In Moldavia, the salt mines of Târgu Ocna were operating during this period. The exploitation of salt was done either directly, through the chamberlain appointed by the lord, or on lease. The lease of the salt mines in Moldavia increased from 300,000 old lei in 1785 to 1,700,000 old lei annually in 1850.

At Târgu Ocna, at this time, about 100,000 boulders of salt were extracted annually, each weighing 100 ocale. The salt extracted here was exported to Poland and Turkey.

Since the beginning of the Capitalist Period, salt production has experienced significant development, both in Transylvania and in Wallachia and Moldavia.

Great progress has been recorded in the salt extraction industry, through organizational measures and the introduction of more rational technical means of exploitation. Since 1861, the state has established a total monopoly on the extraction and exploitation of salt. A special service for the administration of salt mines was established. In Moldavia and Wallachia, from 47,354,578 kg extracted in 1862, production reached 83,000,000 kg in 1873. The increase in production was also due to the introduction of steam power in this sector of the economy.

The salt production of Transylvania and Maramures in the period between 1848 and the First World War came from the Praid, Turda, Ocna Sibiului, Ocna Mureșului, Ocna Dejului, Șugatag, Rona salt pans, etc. The quantity of salt extracted in 1868 was approximately 136,000 tons, registering a significant increase by the end of the century, reaching 172,000 tons. Between 1911 and 1917, salt production increased to 275,241 tons, and then, due to the First World War, it decreased and reached only 153,651 tons in 1919.

The chemical industry also developed, with a direct influence on salt mining. In 1894, sodium products factories were built, first in Ocna Mureș and then in Turda, which used brine as a raw material.

Salt mining in the Szeklerland *cannot be done by just anyone and under any conditions*. Unauthorized mining and possession of salt attracted very severe fines and punishments.

Here is what De Gerado wrote in 1844, in his book entitled "The Land of Transylvania and its inhabitants: *"a salt lump was found in a mother with many children, for which the woman was put in prison"*. Salt therefore means in these lands, not only benefit, but also a lot of suffering.

Around 1860, the Szeklers, Saxons and some of the inhabitants of the upper reaches of the Mureș River were buying their salt from Praid.

In connection with this fact, the historian Orbán Balázs notes: "*although in many villages the Szeklers cut their cellars in salt, and the flocks graze on the salt flats, the man is forced to make a journey of several days to buy the salt necessary for his livelihood*". This fact could be said to be the paradox of the Szeklers who live on mountains of salt, but eat unsalted bread.

In Wallachia and Moldavia, salt continued to be exploited mainly in two large centers: Slănic-Prahova and Tg.Ocna.

Until the mid-19th century, most salt mines were mined in bell-shaped chambers and by means of a stepped cutting system. The specific cutting equipment consisted of simple hammers, sledgehammers, groove-cutting hammers, chisels and wooden wedges with which the furrows were obtained and the boulders were broken, fig.9.

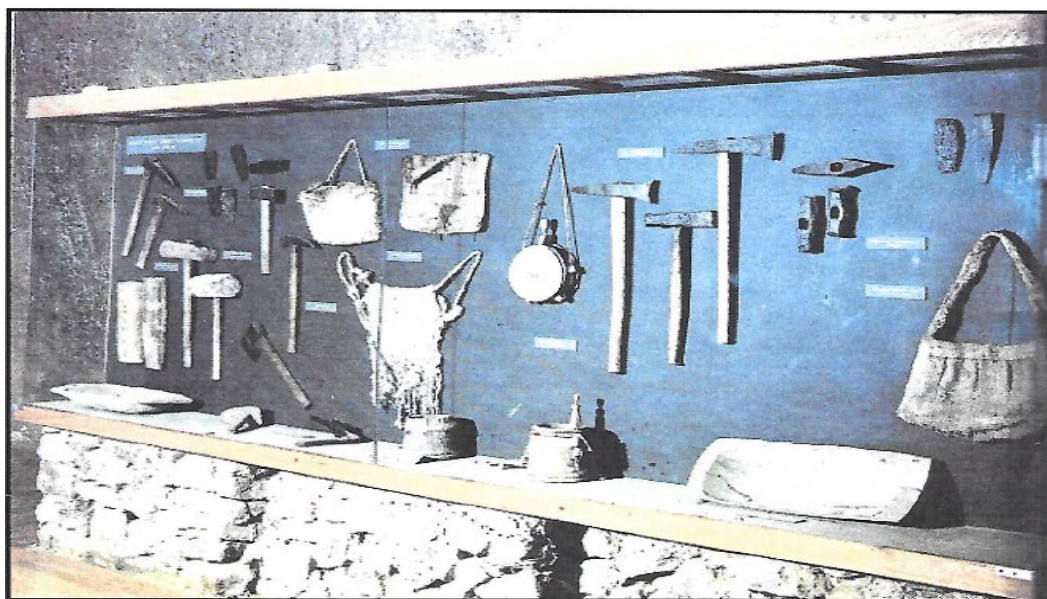


Fig. 9. Salt extraction tools used in the 18th and 19th centuries [3]

The salt was mined by furrows, that is, by detaching parallelepiped blocks with the following dimensions from the massif: 2÷5m long; 0.5÷1.5m wide and 0.3÷0.6m thick. The detachment of the blocks was done with steel wedges and hammers by rhythmic blows, carried out by the hammer workers. After detachment, the furrow was divided by the hammers into almost regular blocks weighing 20-50kg each.

Several rope ladders with wooden steps were suspended in the shaft for the movement of personnel. After 1848, Wallachia and Moldavia also switched to the systematic exploitation of salt mines using the "*Method of exploitation with large trapezoidal-rectangular chambers*", the so-called Maramureș method characteristic of the salt mines in our country.

The exploitation method with large trapezoidal-rectangular chambers was introduced in the salt mines of Transylvania starting with 1800, and in the salt mines of Ocnele Mari starting with 1845. It was later applied to the *Sistematica* salt mine in Slănic, in 1860-1861, at Doftana in 1865, at the *Carol* salt mine in Slănic in 1868 and at Tg. Ocna in 1870.

This exploitation method allowed obtaining a higher percentage of lump salt, expressly requested by exporters. At the same time, new salt mines were opened, at Slănic Prahova and at Tg.Ocna. The salt mines opened during this period were provided with shafts equipped with steam extraction machines. As in the other mines, underground transport with wagons was introduced, and at the surface of the salt mines the connection was made by railways with the railway transport mains, to ensure the transport of the products to the beneficiary.

Moving on to the modern era, the history of salt mines sees the emergence of two new exploitations: Cacica, Suceava County in 1791 and Doftana, Prahova County in 1865.

It is worth mentioning here that the Cacica salt mine operated in Bukovina, which at the beginning of the 20th century produced 5,000t/year. This salt mine was the first to experiment on Romanian territory, before World War I, with the extraction of salt in the form of brine by the dissolution method, using underground mining.

In the 19<sup>th</sup> century, the following salt mines were exploited in Transylvania and Maramures: Praid, Turda, Ocna Sibiului, Ocna Mureș, Ocna Dej, Șugatag, Costiui, Cacica and Rona, which produced a maximum production of over 170,000 tons of salt per year, and in Wallachia and Moldavia the following salt mines operated: Tg. Ocna, Slănic Prahova, Doftana and Ocnele Mari, which produced approximately 130,000 tons of salt per year.

In 1862, the Romanian State took direct control of the exploitation of salt mines, the activity in this field being coordinated by the "State Salt Mines Directorate" established within the Ministry of Industry and Commerce.

The above-mentioned productions were ensured from the same salt pans at the beginning of the 20th century, until the beginning of the First World War. During the war and a few years after, we witness a rather sharp decrease in salt production in Greater Romania, which in 1921 amounted to only 230,000 tons.

In Maramureș County, at Cămara Sighet, in 1918 there was a salt grinding plant with a capacity of 540 tons in eight hours, a salt briquette plant with a capacity of 12 tons in eight hours and a central salt warehouse, which served Ocna Șugatag and Coștiui. Through drilling works, in 1949 the salt deposit in the Vadul Izei-Oncești perimeter was highlighted, the extraction of which is possible by dissolution and does not require underground mining works.

Looking at things in general, it can be appreciated that in the past not enough importance was given to the industrialization of salt and thus it was an untapped wealth for a long time.

After World War I, salt exploitation became a state monopoly, with private capitalist companies not having the right to concession and exploit this mineral in Romania. The importance of the exploitations at Ocna Dej and Ocna Mureș increased due to the high-productivity exploitation technologies implemented at these salt mines. Although the opening of the chemical products factory - Solvay - and the army's requirements during World War I led to an increase in salt production at the Turda salt mine as well, after 1918 the decline in activity was continuous, culminating in the closure of the mine in 1932.

In terms of the workforce used in the salt mines in Transylvania, the work of workers deprived of their liberty as a result of convictions of any kind was never used. The salt was exploited by free people, whose employment was for a period of one year, the contract being concluded on January 7. Analysing historical documents, it can be seen that the salary of a day labourer in agriculture was higher than the wage paid to a day labourer for the same period. The difficult working conditions and low wages led the miners from the salt mines to participate, along with the miners from other mines, in all the protest movements carried out over the centuries.

During the period between the two world wars, the Romanian state proceeded with an action to nationalize and modernize the salt mines and the processes of extraction and valorisation of the salt deposits in Romania. The number of units in operation was reduced by closing the Ocna Sibiului, Turda and Coștiui salt mines because the maintenance costs had become too high.

The salt mines that remained in operation were subjected to a process of systematization and modernization of the technical extraction installations, thus raising productivity in accordance with the requirements of consumption and sales.

All the salt mines in Romania replaced the old methods of cutting salt with hammers and iron wedges, using the explosives cutting technique and mechanized cutting with the help of cutting machine. The introduction of the explosives cutting method contributed significantly to increasing labor productivity, but had the negative effect of reducing the stability of the walls and floors of the chambers - numerous cracks and fissures were formed, generating cracks. The cutting machines were used both for opening works and for carrying out the actual salt extraction works.

Over time, cutting machines of the *Knopp*, *Samson*, *Eichhoff* and *Ural* types were used.

Salt production developed at the main salt pans of Ocna Mureș, Ocna Dej, Târgu Ocna, Ocnele Mari, Slănic and Praid, the others being closed. The remaining salt pans are being modernized, switching to *the exploitation method in large trapezoidal-rectangular chambers, and in Ocna Mureș – to the extraction of brine from underground pools.*

Electric rotary drills were introduced, with a total weight of 9kg and a supply voltage of 110V. The depth of the mine holes was 1.5m, and the *astralite* type explosive was used for shooting, which was initiated with the help of pyrotechnic caps and the *Bickford* fuse. In parallel with these improvements, all the salt mines in operation also replaced the worn-out surface installations with new, modern ones. In this way, work was made easier, labour productivity increased almost sevenfold, and production reached over 350,000 tons in 1938, compared to only 230,000 in 1921.

In the field of salt exploitation in the form of lumps, the most important technical achievements began in 1932 and consisted of the electrification of all the salt mines in the country, the mechanization of extraction by introducing havezes, and the modernization of extraction installations. Salt processing facilities are being improved and facilities for the production of iodized salt are also being built.

In all the salt mines in Romania that remained in operation, modern working methods were applied and the old manual salt cutting procedures, with hammers and wedges, were replaced by the use of explosives and mechanized cutting using cutting machines.

In Central Europe, namely in Germany, Austria and Poland, in the first half of the 20th century, another mining method was introduced into production, namely the mining **method with small chambers and long pillars**, where both the chambers and the pillars were of rectangular profile (fig. 10). The method was also applied in our country since 1950 at the Ocna Mureş salt mine and at the Gh. Dozsa-Praid mine, obtaining an extraction coefficient of over 20%, which means a much higher exploitation of the deposit reserves. This mining method presents, compared to the mining method with trapezoidal chambers, lower losses in the safety pillars and better results in terms of technical and economic indicators.

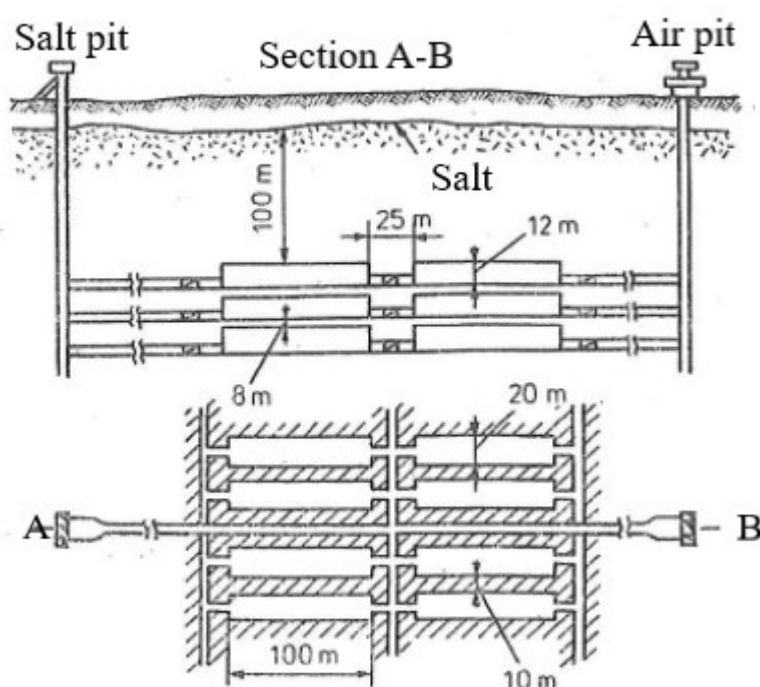


Fig. 10. The exploitation method with small chambers and long pillars

In the USA, **the exploitation method with small chambers and square pillars** was designed and applied for the first time in the world, fig.11.

Considering the advantages presented by this exploitation method, we also moved on, between 1966-1980, to experiments in a pilot salt mine located in the Tg. Ocna deposit. Based on the results obtained, the method was implemented and today it is being worked with in the new mining fields opened at the Tg. Ocna, Slănic Prahova and Ocna Dej salt mines.

Today, in the subunits of SNS "SALROM" S.A. Bucharest, rock salt in solid form is exploited exclusively underground, the current methods being the result of the experience accumulated over the years.

The exploitation is done underground within the methods with chambers and pillars in the following variants: with square chambers and pillars; with rectangular chambers and pillars; with multi-storey chambers and pillars; with chambers, long pillars and embankments.

After the Second World War, our salt mines were modernized by applying new mining methods that allowed the introduction of modern production, loading and transport technologies, so that mining is carried out at the highest level with superior technical and economic indicators.

At the end of the 20th century, solid salt production in Romania was 2 million tons per year, and the production of salt in solution exceeded 3 million tons per year.

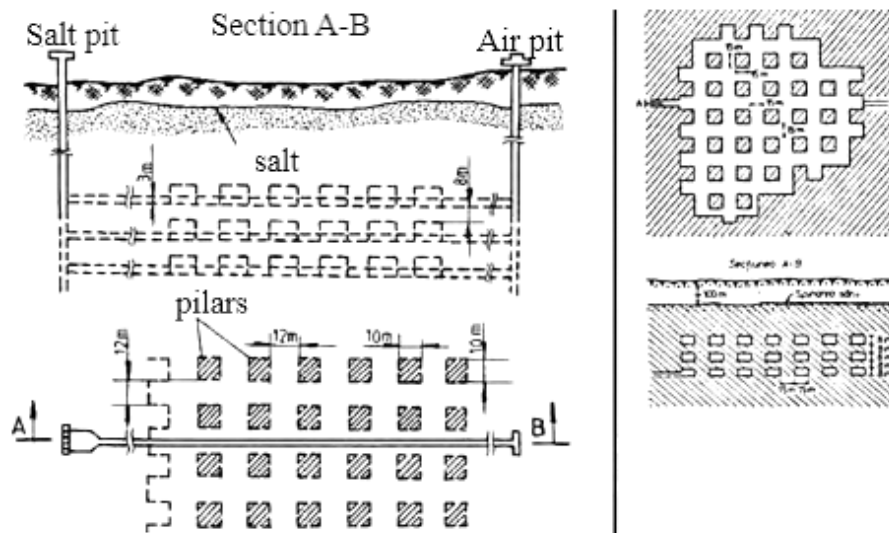


Fig. 11. The exploitation method with small chambers and square pillars

In Romania, currently, the exploitation of salt by dissolution is increasingly used. Although it is considered new, this method is very old. Thus, in China, the Sâciuan region located in the upper basin of the Iantzi River, salt was exploited in the form of brine, using bamboo poles, over 1000 years ago. The brine obtained was evaporated, using as fuel the natural gas extracted from the area and also transported through bamboo pipes.

The exploitation of salt by dissolution has established itself in the last century as a modern and particularly effective method. Romanian industry holds the priority in creating and perfecting the method. Its emergence was determined by the existing experience in drilling wells, by the fact that salt dissolves easily and by the observation that the largest consumer of salt, the chemical industry, dissolves it anyway, since it enters the technological process in dissolved form. In addition to these, we must add the great advantage that the transport of dissolved salt - brine - to large consumers is done through pipes located on the shortest route between the salt pan and the processing plant. The first methods of exploiting salt in the form of brine were those of static dissolution.

The methods of exploiting rock salt based on the principle of static dissolution (the method of exploitation with dissolution in prismatic basins and the method of exploitation with dissolution in truncated conical basins) have been used in our country since 1896 at the Ocna Mureș salt pan, with the entry into operation of the soda factory in the town.

Due to the disadvantages, the methods based on the principle of static dissolution are no longer applied and are replaced by the methods of exploitation by kinetic dissolution which are carried out with the help of probes, fig.12. The method was introduced in our country for the first time in 1949 at the Ocna Mureș salt mine.

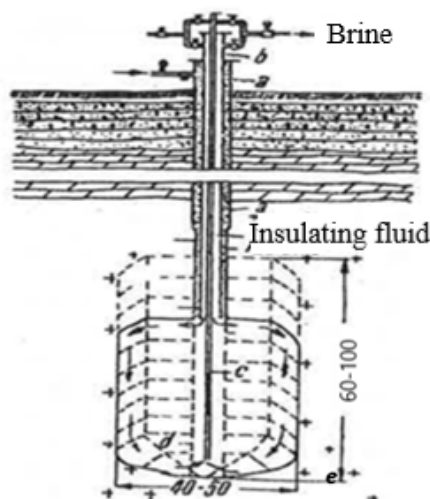


Fig.12. Kinetic dissolution mining method with continuous lifting of mining columns and use of an insoluble liquid as an insulator (fuel oil, diesel, etc.)

a) anchoring column; b) water supply column; c) brine discharge column; d) wellbore drilled in salt; e) salt massif

Currently, the extraction of salt at the working front is done using a technology similar to that applied worldwide. At the base of the chambers, grooves with a depth of 3.0m are cut, using cutting machines. Then, drilling-blasting works are carried out in the working front, from which raw salt results (fig. 13). With the help of loading and transport equipment (dump trucks and belt conveyors), the salt leaves the eternal darkness and reaches the sunlight (fig. 14).

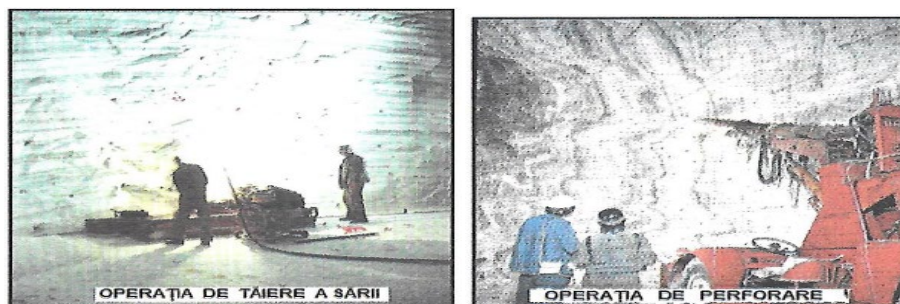


Fig.13. Making the groove with the auger and drilling holes in the working face



Fig. 14. Loading and transporting salt to the surface

In recent years, in some salt pans in Romania (Praid, Slănic Prahova, Ocna Dej), the method of salt exploitation by drilling-shot has been replaced with mining combinatorial machines, thus eliminating the use of explosives, cutting with a hacksaw, baking and protecting the environment by eliminating exhaust gases underground, since the equipment is electrically operated [7].

## 11. Salt pans in Romania over time

From the Neolithic to the present day, a large number of salt deposits have been discovered, researched and put into operation on the current territory of Romania, materialized through over 50 quarries and underground mines from which impressive quantities of this useful mineral substance have been extracted.

The salt pans that have operated over time on the territory of Romania can be divided into three categories:

- salt pans that were put into operation and operated continuously for a single period of time, after which they were permanently closed;
- salt pans that were put into operation and operated in several successive periods, with longer or shorter time intervals between them, and
- salt pans that were put into operation in the past and are still operating today.

Table 1 lists the main salt pans that have operated on the territory of our country in different historical periods.

Table 1. Salt pans that have operated over time on the territory of Romania [1]

| Depression     | Salt Mine | Location                                                                    | Dating                                  |
|----------------|-----------|-----------------------------------------------------------------------------|-----------------------------------------|
| PRE-CARPATHIAN | Ibănești  | The Ibănești Hills, Jijia Valey. Ibănești Village, Botoșani County          | Medieval era                            |
|                | Cacica    | Suceava River Basin, Cacica Village, common Pârtești Common, Suceava County | Neolithic, Modern and Contemporary eras |
|                | Șipotele  | The Miletin Hills, Șipote Village, Iași County                              | Medieval era                            |
|                | Topărăuți | The Miletin Hills, Topărăuți Village, Iași County                           | Medieval era                            |

|               |                       |                                                                                                        |                                                      |
|---------------|-----------------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------|
|               | Lunca (salty springs) | The Culmea Pleşului Mountains, Lunca Village, Vânători-Neamţ Common, Neamţ County                      | Neolithic, the bronze and iron ages                  |
|               | Grozeşti (open pit)   | The Brezunţi Mountains, Troţuş Valey, Grozeşti Village (former Oituz), Bacău County                    | Daco-Roman era                                       |
|               | Târgu Ocna (carieră)  | The Brezunţi Mountains, Troţuş Valey, Târgu Ocna City, Bacău County                                    | Daco-Roman era                                       |
|               | Troţuşul              | The Caşin Depression, Troţuş Village, Târgu Troţuş Common, Bacău County                                | The Medieval era                                     |
|               | Crişeu (open pit)     | The Subcarpathian Hills, Râmnicu Sărat Valley, Crişeu Village (today Râmnicu Sărat City), Buzău County | Daco-Roman era                                       |
|               | Telega                | The Cozmines Hill/ Doftana Valley, Telega Village, Prahova County                                      | Daco-Roman, Medieval and Modern era                  |
|               | Băicoi                | The Prahova Subcarpathians, Băicoi City, Prahova County                                                | Daco-Roman, Medieval and Modern era                  |
|               | Slănic Prahova        | The Prahova Subcarpathians, Slănic City, Prahova County                                                | Daco-Roman, Medieval and Modern era                  |
|               | Baia Baciului         | The Prahova Subcarpathians, Baia Baciului Village, Prahova County                                      | Modern era                                           |
|               | Baia Verde            | The Prahova Subcarpathians Baia Verde Village, Prahova County                                          | Modern era                                           |
|               | Ocna Mică             | The Ialomiţa Subcarpathians, Ocna Mică Village (today Târgovişte Municipality), Dâmboviţa County       | Medieval era                                         |
|               | Ocele Mari-1          | Olt Valley, Olăneşti, tributary, Ocele Mari Common, Vâlcea County                                      | Roman, Medieval, Modern and Contemporary eras        |
|               | Ocele Mari-2          | The Dacian complex from Ocniţa, Caşota Village, Ocele Mari Common, Vâlcea County                       | Neolithic, The bronze and iron ages and Contemporary |
|               | Teişani               | The Amaradia Hills, village Teişani, common Gherceşti, county Dolj                                     | Medieval era                                         |
|               | Săraru                | The Amaradia Hills, Săraru Village, Gherceşti Common, Dolj County                                      | Medieval era                                         |
| TRANSYLVANIAN | Teişani-Ghiţioara     | The Amaradia Hills, Ghiţioara Village, Gherceşti Common, Dolj County                                   | Medieval era                                         |
|               | Praid                 | The Gurghiu Mountains, Praid Basin, Praid Common, Harghita County                                      | Roman, Medieval, Modern and Contemporary eras        |
|               | Rupea                 | The Gherghel Hills-Olt Valley, Rupea Common, Braşov County                                             | Roman era                                            |
|               | Ocna Sibiului         | The Hârtibaciu Plateau, Târnave Basin, Ocna Sibiului Village, Sibiu County                             | Roman, Medieval, Modern and Contemporary eras        |
|               | Ocna Mureşului        | The Târnave Plateau, Mureş Valley, Ocna Mureşului City, Alba County                                    | Roman, Medieval and Modern eras                      |
|               | Răzbieni-Cetate       | The Transilvania Plain, Mureş Basin, village Răzbieni-Cetate Village, Ocna Mureşului City, Alba County | Roman and Medieval eras                              |
|               | Uioara                | The Transilvania Plain, Mureş Basin, Uioara Village, Ocna Mureşului City, Alba County                  | Roman, Medieval, Modern and Contemporary eras        |
|               | Unirea                | The Vinţu Mountains, Mureş Basin, Vinţu de Sus Village, Unirea Common, Alba County                     | Roman, Medieval and Modern eras                      |
|               | Cojocna               | The Transilvania Plain, Cojocna Village-Common, Cluj County                                            | Roman, Medieval, Modern and Contemporary eras        |
|               | Petea                 | The Someş Basin, Someşul Mic tributary, Petea Village, Apahida Common, Cluj County                     | Roman era                                            |
|               | Sânpaul               | The Cluj Hills, Someş Basin, Sânpaul Village-Common, Cluj County                                       | Roman era                                            |

|           |                   |                                                                                                            |                                               |
|-----------|-------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
|           | Sic               | The Someșul Mic Valley, Sic Village-Common, Cluj County                                                    | Roman, Medieval, Modern and Contemporary eras |
|           | Turda             | The Arieș Valley<br>Turda City, Cluj County                                                                | Roman, Medieval, Modern and Contemporary eras |
|           | Ocna Dejului      | The Someș River Basin upstream of the confluence with the Someș Mic River, Ocna Dej Common, Cluj County    | Roman, Medieval, Modern and Contemporary eras |
|           | Rogna             | The peak of the Brezea, Someș Valley, Rogna Village, Ileanda Common, Sălaj County                          | Roman era                                     |
|           | Zalău             | At the foot of the Mezeș Mountains, Zalău River Basin, Zalău City, Sălaj County                            | Daco-roman era                                |
|           | Arpaș             | The Ciceu Hills, Someș Valley, Arpaș Village, Bistrița-Năsăud County                                       | Roman era                                     |
|           | Bața              | The Ciceu Hills, Someș Valley, Bața Village, Petru Rareș Common, Bistrița-Năsăud County                    | Roman era                                     |
|           | Beclean           | The Ciceu Hills, Someș Valley, Beclean Common, Bistrița-Năsăud County                                      | Roman era                                     |
|           | Ciceu             | The Ciceu Hills, Someș Valley, Ciceu Village, Bistrița-Năsăud County                                       | Roman era                                     |
|           | Cristur           | The Bistrița Depression, Someș Valley, Cristur Village, Bistrița-Năsăud County                             | Roman era                                     |
|           | Domnești          | The Bistrița Depression, Someș Valley, Domnești Village, Mărișelu Common, Bistrița-Năsăud County           | Roman era                                     |
|           | Ilișua            | The Someș Valley, on the bank of the Ilișua tributary, Ilișua Village, Uriu Common, Bistrița-Năsăud County | Roman and Medieval eras                       |
|           | Mănăstur          | The Ciceu Hills, Someș Valley, Mănăstur Village, Petru Rareș Common, Bistrița-Năsăud County                | Roman era                                     |
|           | Reteag            | The Ciceu Hills, Someș Valley, Reteag Village, Petru Rareș Common, Bistrița-Năsăud County                  | Roman era                                     |
|           | Sintereag         | The Ciceu Hills, Someș Valley, Sintereag Village-Common, Bistrița-Năsăud County                            | Roman era                                     |
|           | Tahat             | The Ciceu Hills, Someș Valley, Tahat Village, Bistrița-Năsăud County                                       | Roman era                                     |
| MARAMUREȘ | Rona              | The Maramureș Depression-upper course of the Rhone River, Rona de Sus Village-Common, Maramureș County     | Medieval, Modern and Contemporary eras        |
|           | Coștiui-Rona      | The Maramureș Depression, Rona de Sus Village-Common, Maramureș County                                     | Medieval, Modern and Contemporary eras        |
|           | Ocna Șugatag      | The Ciceu Hills, Someș Valley, Ocna Șugatag Village-Common, Maramureș County                               | Roman era                                     |
|           | Vișeu             | The Maramureș Depression, Vișeu River, Vișeu Village, Vișeu de Sus Common, Maramureș County                | Medieval era                                  |
|           | Bășcoi            | The Maramureș Depression, Vișeu Valley, Bășcoi Village (unidentified) Maramureș County                     | Medieval era                                  |
|           | Câmpulung la Tisa | The Maramureș Depression, Vișeu Valley, Câmpulung la Tisa Village-Common, Maramureș County                 | Medieval era                                  |
|           | Dragomirești      | The Maramureș Depression, Iza River Basin, Dragomirești Village-Common, Maramureș County                   | Roman, Medieval and Modern eras               |
|           | Slatina           | The Maramureș Depression, Vișeu Valley, Slatina Village, Maramureș County                                  | Medieval era                                  |

## 12. Conclusions

Known as one of the oldest salt-producing regions, Romania represents an important potential in terms of this natural wealth, our country being ranked among the top 15 countries in the world in this respect, while also occupying 4th place in Europe.

We conclude by showing that the subsoil of our country contains numerous and varied deposits of useful mineral substances. Mining is called upon, as per the demands of the economy, to make these mineral riches available to industry through the rational and efficient exploitation of all the deposits available in the subsoil of Romania, among which salt occupies a prominent place.

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