

## Roman Mining in the Valongo System (Portugal)

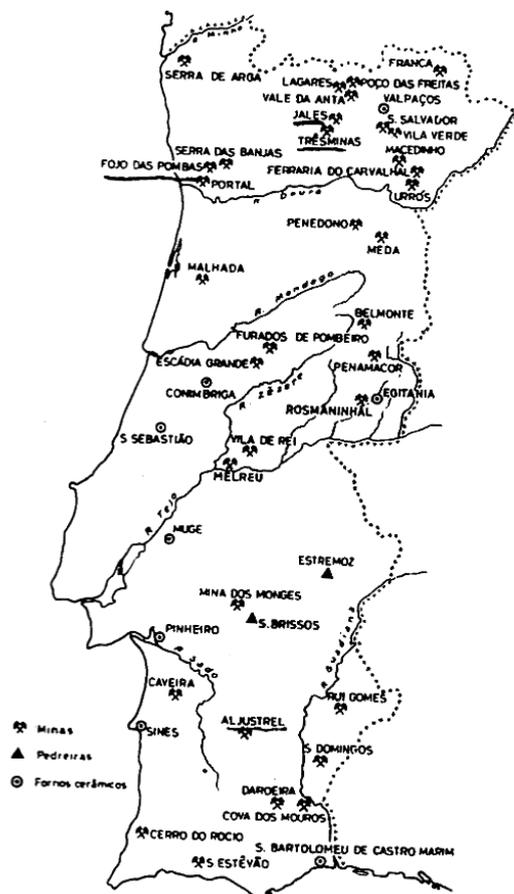
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### Summary

Mining was one of the most important economic activities during the roman period. The extraction would, in many occasions, subsidise the expenses of the Legions. The Romans intensively explored all occupied territories, adapting and developing new mining techniques specific to each local. In Portugal many are the examples of mining exploration, namely of gold and copper. The Valongo mining system is a paradigmatic example of gold extraction in this part of the Empire; being as well the most important work developed by the Association in an artificial cavity, with reference to the fields of Surveying and the application of special Speleological techniques in shale rock.

This paper has the **purpose** of presenting a brief resume about the mining techniques used by the Romans, especially in Valongo, a Roman site in the North of Portugal.



The **first two centuries** A.D. were actually the apogee of this activity in the Peninsula.. And it was its gold that made possible the payment of all expenses of the Roman Legions. In the words of Plutarcus (Cat. 10; Front.4, 7-35), the army expenses were supported by the Hispania mineral resources; and Diodorus (V, 36-38) said that “when the Romans conquered the Peninsula, Italics in great number exploited the mines obtaining enormous richness.” According to Pliny, the gold from the northwest of the Peninsula in the first century granted the Roman exchequer about 20.000 roman pounds per year, about 6.5 tons/year, , [(Garcia Bellido, 1970), Artur Martins, s.d.].

## The Mining Activities

The mining activities were developed in three distinctive manners:

**Placer Mining**, in river alluviums, rich in gold or tin. The Tagus River, is an example Douro, Minho and Alva Rivers has well.

**Open-Pit Mining**, where great craters were opened in the landscape, as an example we have Três Minas Place.

**Level and Shaft Mining**, to reach and follow the ore veins. Three paradigmatic examples in Portugal are Valongo, Aljustrel and Jales.

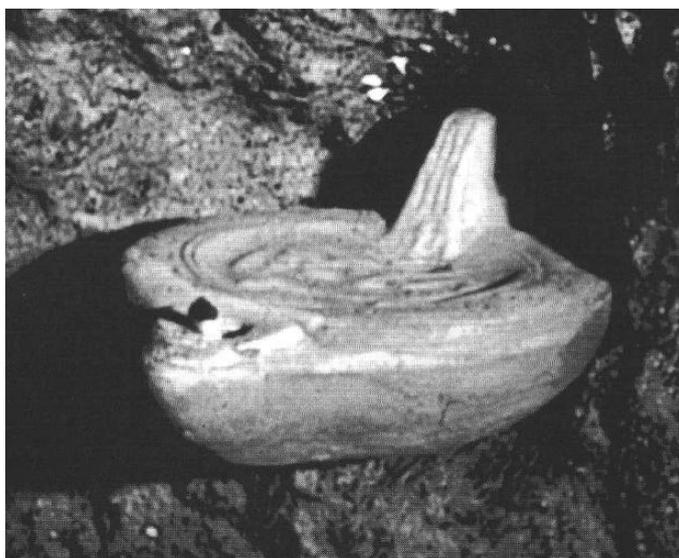
The amount of gold, taken from the geographic area between Valongo and Castelo de Paiva (24 km away), was extremely significant – about 20/40 gr by ton of sedimentary schist. In this area is situated the **Serra de Santa Justa, in Valongo**.

As a proof of this chronological period, were found, in the 60's, several artefacts, such as metal jars and roman lamps.

This sort of works involve a great amount of dangers. The main problems can be identified as being the **lack of light, ventilation problems, the constant presence of water and the need to drain it**.

The Romans developed several **solutions** for the mentioned problems as well for several other ones. In order to minimize the ventilation problems, made worse by the temperature rise as the depth increases in the shafts, as well the accumulation of toxic gases, additional air shafts were created to improve the air circulation inside the mine with promoted convection currents that would bring the fresh air from the surface to the interior of the mine.

Regarding the illumination of shafts and galleries, the romans used their daily objects – such as roman lamps – placing them in niches excavated in the walls of galleries being worked. Several of these lamps were found in mines explored by the romans, assuring the chronology of the mining works. Stone and terracotta dishes with fuel were equally used, and much likely torches, placed in better ventilated places; Diodorus makes references to small lamps placed in miners heads in order to improve the illumination in the individual workplace.

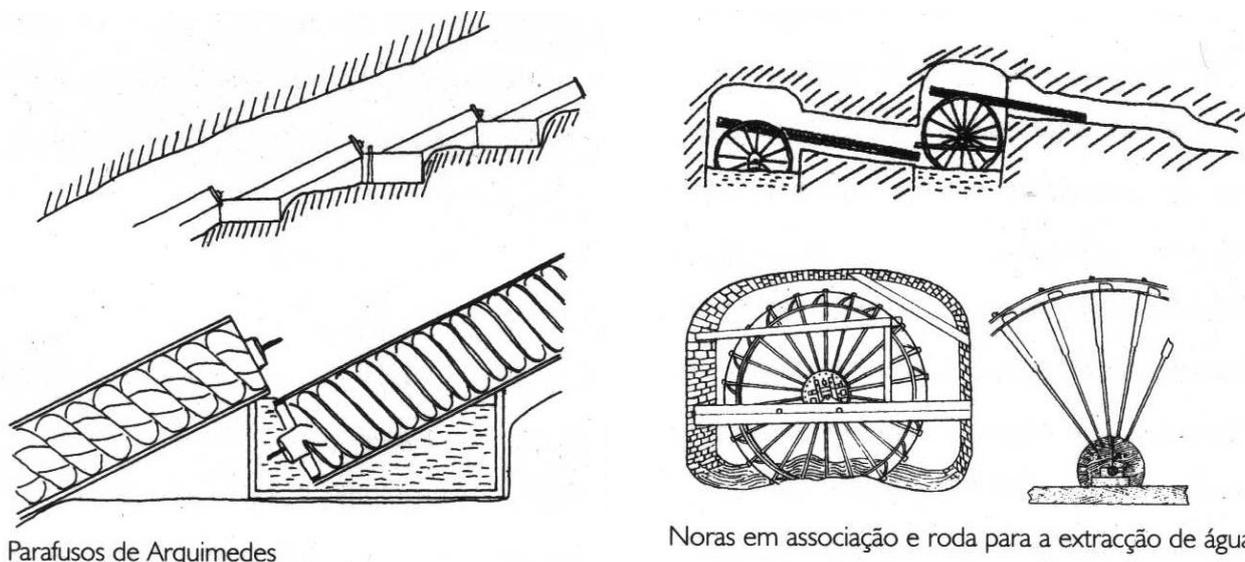


*Roman lamp in a nich (Valongo)*

Underground water accumulated in the new shafts was drained by systems created specially for that purpose. Therefore the **Archimedes or egyptian screw**, which consisted in a group of several big length helix, rotating in a never ending system.

The **waterwheel** used in groups was another system used for draining purposes; they were built in wood, with bronze axis and buckets.

However, given their morphology, not all of the mines could use those techniques and devices; in this cases the draining was made by carrying the water in esparto buckets and bags, adapted to this task.



Parafusos de Arquimedes

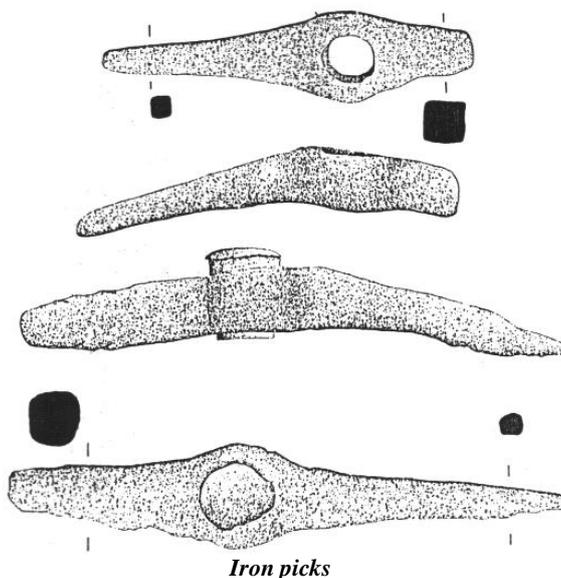
Noras em associação e roda para a extracção de água

In **Santa Justa (Valongo)** gold mines the draining was made by digging a **twin shaft**, at a short distance from the main one. The principle was to move the water from one shaft to the other, consecutively. Therefore one of the shafts could be dried, allowing the digging work to proceed. There were also galleries named "*cuniculo qui metallis subducet*" (**draining galleries**), made with the purpose of carrying the water out of the mine, to a distant place, usually a creek. This method was commonly used in fairly large mines such as Valongo.

Shafts were also opened in order to allow the ventilation and peoples access to the mine.

Other materials were used in the mining activities, such as wooden stairs, iron tools (used to remove the ore); esparto sandals and berets for the miners, ropes also in esparto used to bring the ore to the surface.

For the production of this materials and the maintenance of a large contingent of men, who worked on the mines, was surely necessary the development of several economic activities such as agriculture and cattle raising, to feed the workers, ropery, carpentry, woodworkers and blacksmiths providing all the utensils used in the mines and the gold ore processing as well.



Iron picks

## The Valongo Roman Mines

Due to the lack of archeological studies there are not many published articles about this site.

However its historical importance recognized since 18<sup>th</sup> century. One of this written examples from 1758 *Memórias Parochiaes*, that read as follows: “*Na dita serra pella parte do Norte sitio de Espinhaço de Cam se acham fojos poreem quazi tapados algum ainda conserva a altura de vinte palmos, e como ella he ramo da de Valongo e de santa Justa aonde ha muitos com escadas subter-raneas, he sem duvida que os seus fojos se tirou no tempo dos romanos muita quanti-dad de ouro, de que hião repletos os Preconsules que governavão a Hespanha no tempo da republica e ainda do Imperi como dis Plinio e não ha muitos annos sendo vivo o Senhor Rei D. Joam o 5º por ordem sua vejo hum mineiro a esta serra, e que achara o ouro [...]*”.

References to the existence of this mines and the large amounts of gold extracted are traceable since Pliny, therefore proving the economic importance of Serra de Santa Justa mining activities.

Analysing the shafts and galleries extension we must conclude that large amounts of gold ore was extracted from this place, for an extended period of time.

To achieve all this work, was undoubtedly necessary a great number of slavery work. In order to assure the security a large amount of legionaries were present.

Much likely (although there is no archeological evidence of the fact), for such a great number of persons, a large amount of equipments to support the mining activity; specific mining equipment, daily objects and food supplies would be indispensable.

Surely an habitat and its necropolis, as well as places to process the gold ore would be part of the landscape.

**The roads** are another important subject of study. Probably with its analyses we can obtain information about the gold routes and its destinations. This roads were surely connected with several mining exploration sites, and were certainly the faster and safer way to carry this good.

The only Serra de Santa Justa study elements available were collected in 1961 during an unobstruction performed by the Serviço de Fomento Mineiro in Fojo das Pombas. The artefacts found during the woks were published in “*Achados Romanos na mina do Fojo das Pombas (Valongo)*” by Luís de Albuquerque e Castro. Several pottery artefacts, a II century roman lamp (Ponsich II B) and twelve metal objects.

This was the first study made with an archeological perspective, to witch some continuity should be given in order to bring more knowledge about this important roman site.

This mine has twin shafts to reach the gold veins, water draining and ventilation.

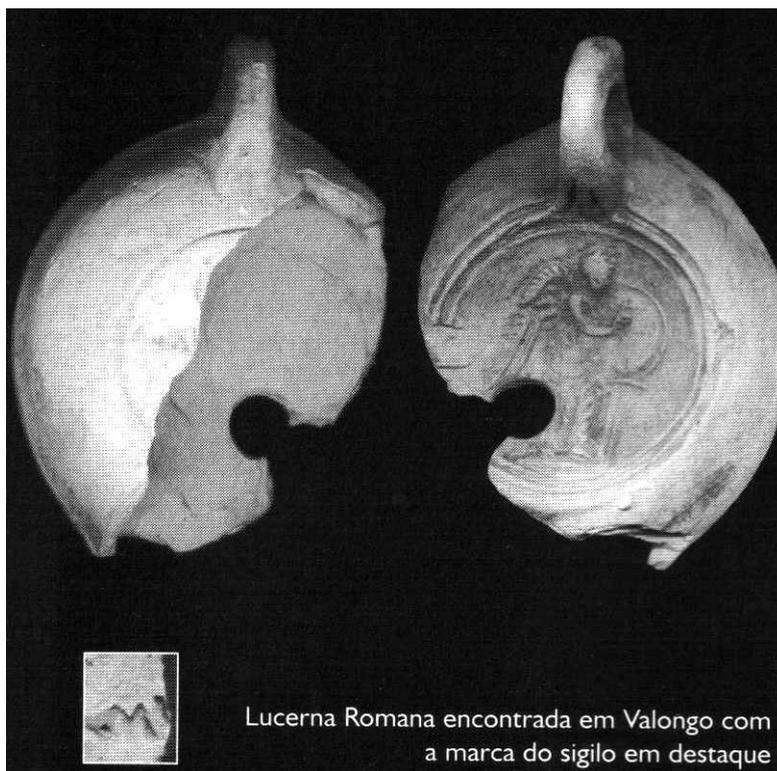
The other draining technique in Valongo was the use of draining galleries, as mentioned above. One of those galleries, 350 meters in length, ends on a small creek. This same river could also be used to wash the gold ore. There is also the possibility for the existence of equipments used to process the ore in location, due to the large production of the mines. To confirm this large amount of gold extracted we have the analyses made by the Direccção-Geral de Minas e Serviços Geológicos (Mello Nogueira, 1935) showing that the ratio ore/gold was 84grams per ton.

At the moment we do not have any kind of archeological findings connected with this ore processing in Valongo.

The shafts and galleries opening was made with metal picks, from witch marks can be observed on the mine walls. We can also observe niches on the walls, where roman lamps were placed.

Last year another roman lamp was found, during an A.E.S.D.A. espeleological activity. In this lamp we can observe a winged female figure in the *discus*. She's turned to the right side and carries a disc (*Clipeus*), on the top of a altar like column. The figure is a *Victoria*, one of the usual themes since the first century.

In our study we looked for several *Victorias*, in order to compare them, but found none similar to this one except the one found in the same mine, in 1961. We can attribute this lamp to Dressel 20 tipology and Ponsich II B2.



In the bottom there is a sigil with the letter M and part of the letter V. This leads us to think that its origin reports to the MUNTREPT pottery and the potter called L.MUNATIONS (Belchior, 1969)

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