

Salt production and its social and economic context

Anthony Harding - *University of Exeter*

Our understanding of the technology of salt production has developed considerably in recent times. Both theoretical and experimental reconstructions of the production methods have shed light on exactly how a pure (or relatively pure) salt was achieved from a range of briny materials (seawater or salt streams and springs). Even rock salt, which in theory can simply be crushed and used without any further work, may be more palatable when subjected to some processing features, for instance dissolving in pure water and recrystallising in order to remove impurities.

This is not to say that every aspect of the technology of salt production is understood. A number of obvious problems present themselves, for instance preventing briquetage containers placed in simple hearths from cracking, or the precise means by which the natural impurities in seawater (and many brine springs) is achieved. In salt pans, the processes seem to be well understood: the brine is passed through a series of pans, in each of which impurities are progressively removed (first calcium carbonate and iron oxide, then calcium sulphate, and then magnesium sulphate and magnesium chloride – which, however, tend to precipitate along with the sodium chloride, giving the salt a bitter taste). These processes may affect briquetage salt as well, in one form or another.

In the past I have identified three broad zones of production, which I have called the solar evaporation zone (in Europe principally the shores of the Mediterranean), the briquetage

zone (all of northern and much of central and western Europe), and the trough zone, named after a technology specific to Transylvania and adjacent areas. While the first two of these are not exclusive, the last one is – so far. I should also mention that where rock salt outcrops occur, as is the case in several parts of central and eastern Romania, it is possible simply to quarry the rock by hacking off lumps. This is only possible in these restricted areas, however.

Salt production was self-evidently an important industry in ancient times. Giovannini argued that salt production in the Ostia saltworks was a principal reason for the rise of Rome; it has long been argued that the wealth of Hallstatt was the result of its control of the salt production and distribution; Romanian scholars argue that the reason for the very large bronze hoards found in the Late Bronze Age was the presence of large salt sources especially in Transylvania, which were supposedly controlled by local producers. Among the range of occupations we know from the Roman literary sources are the *conductores salinarum* (their precise role unclear), while there is the famous example of the individual in late 3rd century republican Rome who was given the nickname of Salinator (salter) because he had introduced a new salt tax. Salt production in Roman Italy was a well-known industry, though more is actually known about its economic consequences than its production technology.

All this suggests that the context of salt production was crucial to any understanding of its significance in the various societies of the ancient world. Of course we know that everyone needs salt, then as now. The question is, how was that production organised? Who formed the workforce to undertake the production? Was it part of a domestic process, in which salt was produced for household and local needs, or was it a much more elaborate process, with

the quantities involved indicating that it was traded both to other communities locally but also to more distant places? Was the work done by males or females, adults or children? All of these questions need to be answered; and they may well differ according to the production method.

One may approach the problem from a number of different angles. One is to estimate the total amount of salt that could be produced by different methods, and work out from presumed population of given communities (both human and animal) how much salt would be needed on a daily (monthly, annual) basis. Another would be to use proxy evidence for the make-up of the communities undertaking the work.

As far as I know, there is little reliable evidence to go on for the former approach. Laurent Olivier's work on the huge production sites around Marsal in the Seille valley indicate a huge production, of a kind he terms "proto-industrial"; but realistically it is impossible to do more than give very broad indications of exactly how much salt might have been produced over the lifetime of the working areas. By contrast, Dan Buzea has done experiments with the trough technique and found that very large quantities of rock salt, in large or small chunks, can be obtained rapidly by letting water drop down onto the rock and then breaking up the surface with hammers.

On the matter of the gender make-up of the workforce, two pieces of work stand out. One is the finding by Doris Pany that showed that both males and females in the Hallstatt cemetery had stress markers on their bones, suggesting that both sexes were involved in heavy work. The other comes from a recently completed PhD at the University of Leicester, on fingerprints on briquetage from a number of British Iron Age sites, again showing that both sexes were represented. These might be taken to confirm the suggestion of Laurent

Olivier, on the basis of the finding of rings of lignite or schist of a kind found with other ornaments in contemporary graves in and near the Seille valley, that this might indicate the presence of women in the workforce. Taken together, the evidence for a mixed workforce of males and females in some if not all salt production sites seems convincing.

Of course, all this needs to be set in the wider social and economic context of the societies within which the production was taking place. It is a truism to say that salt was a very important resource in ancient times; it is more of a challenge to say quite how important in the overall scheme of things. For this, it is the classical sources which will help us the most, even though they are frustratingly silent on output. Economic histories of Rome are not able to say in any detail what exactly the contribution of salt production was within the economy of the empire, other than specifying that the procurement of salt was a necessity. Obviously for prehistoric societies the problem is much greater.

These various pieces of work, important in themselves, combine to provide a newly dynamic picture of how salt production worked and how it might have been embedded in society.

There is still much to do to locate that production more precisely in the various areas and periods of ancient Europe that fall under our purview. Given recent developments, however, I think we may be confident that in the coming years much progress will be made.