

Volcanic lava millstones from Switzerland
Petrographic study of comparison of archaeological objects and lava
from the Massif Central

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Master thesis in Geosciences

The present master's thesis consists in a petrographic research in the field of archaeometry with the aim of characterizing and researching the origin of volcanic rock millstones from the Roman period discovered in Switzerland. As this type of rock is not present on Swiss territory, it can be affirmed that these objects were transported over long distances.

Millstones from the Swiss sites of Avenches (VD) and Rodersdorf (SO) were included in the study as well as millstones from various French sites for which samples or published petrographic data were available. Grinding stone quarries are known in different volcanic regions of the Roman Empire, particularly in Italy, Germany and France. Some of them have been the subject of reference petrographic studies. On the other hand, a production of millstones has long been suspected in the French Massif Central but no quarry has been identified in the field. A sampling campaign was carried out in the Chaîne des Puys.

In-depth investigations (macroscopic and microscopic description, chemical analyses) were necessary. 88 millstones were studied, of which 62 thin slices and 53 chemical analyses (41 XRF and 12 LA-ICP-MS) as well as 86 natural rock samples, of which 61 thin slices and 71 chemical analyses (XRF) were processed. In order to formulate hypotheses of natural source - archaeological object connection, the lithotype concept was used. 15 categories that group rocks by similar characteristics regardless of their provenance were designed. The results indicate a very good correlation for 13 Swiss millstones (10 from Avenches and 3 from Rodersdorf) and 1 French millstone (from Bassou) with the locality of Bravant in the lava flows produced by the Puys de Barme. On the ground, one observes at this place an escarpment which could be a front of size of an ancient quarry. Other samples find links, even if they are less bright, in the flows of the Puy de Côme (8 millstones of Avenches and 2 millstones of Barbegal (F)). Other cases are isolated: a millstone from Autun (F) in the Puy de Montchal near Randanne; a millstone from Bibracte (F) in the Puy de la Nugère (Volvic stone) and a millstone from Avenches also in the distal flows of this last volcano. The other archaeological millstones studied could not be put in direct relation with the rocks collected in the field. All these results are promising, but many archaeological finds do not yet have a verified origin. New targeted sampling campaigns would be necessary to complete the information on the archaeological objects whose origin could not yet be confirmed.

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