the use of water wheels for draining ground water in roman mines

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Roman mines faced numerous problems that caused work to be discontinued and sites were abandoned. One of the problems is groundwater resulting from digging near rivers or sees or leakages from the top of the mine. The Romans initially tackled this problem using the primitive means – current since the earliest times – of digging canals to redirect the flow of groundwater and then raising it using buckets and ropes. Later they introduced mechanical machines like Archimedes' screw, which they soon replaced with the more modern waterwheel. An Alexandrian invention dating from the Ptolemaic era, the waterwheel had spread across the Mediterranean where it was used for agricultural work until the Roman era when its design was developed for use in a variety of fields including mining. Hundreds of waterwheels were used to lift water out of the Roman mines. This paper raises a number of questions regarding how the waterwheel was used in mines, how giant machinery was transported into the mine, what was the mechanism for operating them once they were inside, were they similar to agricultural waterwheels (which relied on either water pressure or human and/or animal power), and when and why the Romans started using them. In the absence of primary sources dealing with the topic, research relies on various theories proposed following excavations in which mines were discovered at various points in history. The writer outlines the history of these discoveries and undertakes a comparative study of the theories proposed in order to reach the most plausible explanation.

The paper follows the following scheme:

1-Introducing and describing the waterwheel as defined by the Roman engineer Vitruvius;
2-Surveying the discoveries and presenting the theories that were proposed at the time they were made over the centuries; and
3-Surveying modern discoveries and comparing them to older ones.

Roman mine ،water wheel ،Rio tinto,Dolacothi

Results:

1.The Romans preferred waterwheels to Archimedes' screw both for speed and ability to raise larger quantities of water.
2.There may be an error in the restoration of the British Museum waterwheel and the Dolaucothi waterwheel.
3.The ideal position of the worker for pushing the waterwheel is on the empty side at a 45-degree angle.

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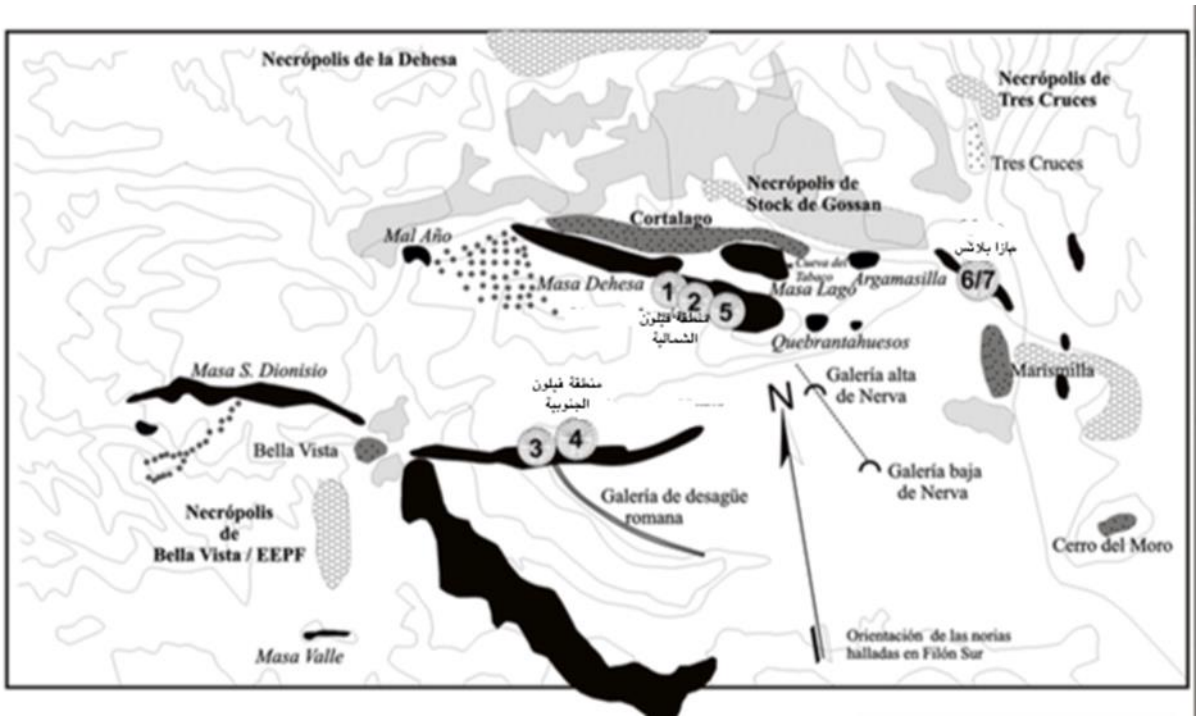
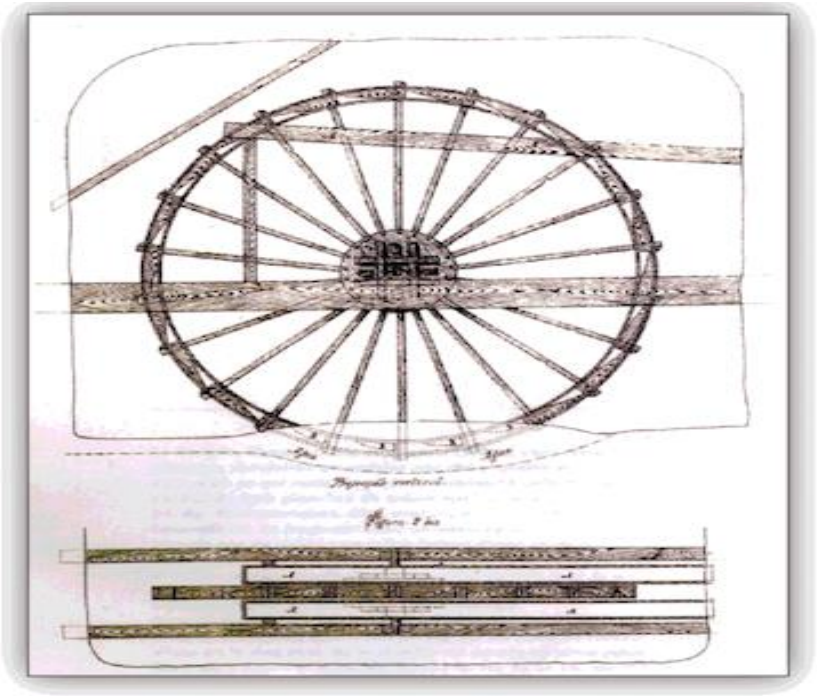
Recommendations:

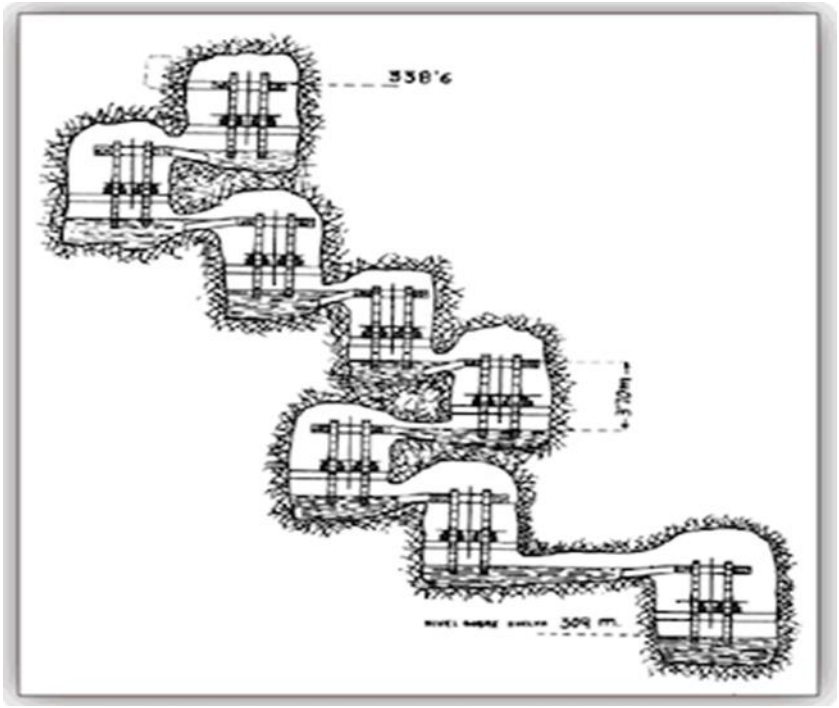
Scholars should continue to follow modern discoveries of Roman mines and compare them to previous and ancient discoveries, paying special attention to Roman Dolaucothi especially with a view to affirming or denying the existence of a different kind of waterwheel, other than those known from the Rio Tinto Mines in Spain.



Map of Rio Tinto



Sao Domingo water wheel
DOMERGUE, C.; BINET, C; BORDES, J.H. 1999:



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