



Excavating a Late Bronze Age mining settlement near the spring at Corta Lago

Spring of sweet water marks Rio Tinto's first mining camp

A spring of sweet water trickling from the side of Cerro Salomon — the hill of Solomon — marks the site of Late Bronze Age mining and smelting at Rio Tinto, the world's oldest mine still in production today in southern Spain.

This is one of a number of important discoveries made by a team of archaeo-metallurgists and miners taking part in a second season of fieldwork in an IAMS project to probe the earliest beginnings of Rio Tinto.

The spring rises from the mountain on the north side of today's great open-cast mining operations at Corta Lago. Local people still drink from it as they have done for more than 3,000 years.

Rio Tinto's early miners settled around this spring in about the 12th century BC. And they built an aqueduct — the remains of which can still be seen — to carry its water to the furthest parts of their village.

Today, the surrounding countryside, once hills and valleys, has been flattened by bulldozers and excavators. The main objectives of IAMS's fieldwork last season were to make a detailed investigation of the ancient slag — on which much of the modern enterprise is built — and to search for relics that have survived the latest mining activities.

The latter task was undertaken by a team from the Derbyshire Mining Museum, led by Dr. Lynn Willies, and its members faced considerable hazards in reaching and exploring old workings on the steep face of the open pits of the North Lode.

Their most exciting find was a cave, about 50 metres

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long, where jarosites — the silver-rich ore sought by the ancients — could still be seen on its walls. This cave-mine, located at the bottom of the gossan head, penetrated the secondary enrichment zone of the pyrite deposit. It is quite possible that it was originally part of the famous Cueva del Lago, a silver mine dating to the Late Bronze Age (12th-9th century BC), most of which has already disappeared into the jaws of modern bulldozers.

The entrance to the cave is only 100-200 metres from the early mining settlement which grew up around the spring, and its discovery could provide the answer to the question how miners of 3,000 years ago recovered silver hidden beneath gossan more than 50 metres from the surface. It now seems likely that they — or even generations of miners before them, belonging to the Argar culture (of which much evidence is to be found in nearby Nerva) — drove into the side of the mountain, creating caves which early literature has described as being "as big as churches" and full of silver ore.

Last season's investigations of slag heaps has provided clear evidence of Rio Tinto's silver production going back to the days of the Tartessians. These Late Bronze Age metallurgists already used a sophisticated smelting technology which was not substantially improved upon until Roman times. Contrary to previous assumption, the Phoenicians did not import any new technology, and it seems doubtful if they ever reached Rio Tinto at all; the "Phoenician pottery" found in the area is now thought to have reached there as containers for merchandise, the Phoenicians being essentially traders.

After the Tartessian-Late Bronze Age beginnings, local Iberian traditions and technology of metal production continued throughout the first millennium BC, developing in, and radiating from, the settlement around the Corta Lago spring. By the time of the takeover of the Rio Tinto mines by Imperial Rome, smelting installations and slag heaps covered an area of several square kilometres. It was only then — in the 1st century AD — that the indigenous methods of metal production were replaced by improved technologies of silver-copper-iron extraction.

Next season's work at Rio Tinto will be mainly concerned with an investigation of dwellings and other ancient buildings. In particular, excavation is planned of a Roman town, built on top of the silver slag, which could also have been a centre of administration for extensive copper mining.

It is also considered that a strange-looking earth mound, not far from the modern mine, and first noticed by local hunters, could conceal a dolmen of the 4th millennium BC, and this, too, will be excavated.

Investigations at Rio Tinto are under the auspices of Madrid University (Professor Antonio Blanco-Freijeiro) and sponsored by Rio Tinto Zinc Minera, Madrid.

Publications

B. Rothenberg, *The Mining Sanctuary of Timna*, is at present with the printers.

IAMS Monograph Number One, Rothenberg-Tylecote-Boydell, *Chalcolithic Copper Smelting*, is still available from Thames and Hudson, 30-34 Bloomsbury Street, London WC1, or directly from IAMS London office. The monograph series is shortly to be continued with a report on excavations of the ancient mines of Chinflon (SW Spain).

A report on the excavations of the ancient mines and smelting camp No. 30 at Timna is published (in German): H.G. Conrad — B. Rothenberg (ed.), *Antikes Kupfer im Timna-Tal*, available from Deutsches Bergbau Museum, Bochum, W. Germany.

A first review of the Sinai explorations 1967-1978 by the Arabah Expedition, affiliated to IAMS, is published by Kummerly & Frey, Bern, Switzerland: B. Rothenberg — H. Weyer, *Sinai, Pharos, Miners, Pilgrims and Soldiers*, (also in French and German editions).

Papers on Timna metallurgy by Prof. H.G. Bachmann and Dr. P. Craddock, members of the IAMS research group, and by Prof. B. Rothenberg on Chinflon are published in *Scientific Studies in Early Mining and Extractive Metallurgy*, British Museum, Occasional Papers, No. 20 (obtainable from British Museum, Great Russell Street, London WC1B 3DG).

Prof. R.F. Tylecote's *Metallurgy in Archaeology*, which has become a standard text book and has been out of print for many years, is to be republished in a revised and enlarged edition in 1984. This will be followed by a further work on metallurgy in prehistoric Europe in 1986.

Chinese excavate ancient copper mine

A recent publication of the Chinese Relics Publishing House, Beijing, recounts the history of the Tonglūshan mine, in the ancient State of Chu, on the Yangtze River.

Tonglūshan is the biggest of all Chinese ancient copper mines so far excavated, and the one with the longest production record. Four hundred thousand tons of ancient slag have been found on the site, together with several hundred vertical shafts and drifts of different structures, and 25 smelting furnaces of various dynasties.

Tools found dating to before the 6th century BC include wooden shovels, rakes and hammers, bronze adzes, chisels and pickaxes. With these simple implements, miners excavated shafts and drifts as deep as 50 metres and solved the problems of timbering, ventilation, drainage and illumination.

The Tonglūshan mine was in production nearly 3,000 years ago and it has been estimated that 80,000

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