



The hill in the Timna Valley around which the "Dark Age" smelting site was located. In the background are the mountains of Edom in Jordan

Metal-working in the "Dark Age" of the Near East

Evidence of metal-working in the Timna valley in Israel's Negev Desert during a little-known period in the 2nd millennium BC is one of several recent discoveries of IAMS's field operations.

Nearly a quarter of a century of exploration in the Wadi Arabah, the rift valley which divides Israel and Jordan from the Dead Sea to the Gulf of Aqaba, established up to the middle of last year more than 300 sites of ancient mining and smelting in the area.

Yet, a "new-look" over the past few months has resulted in significant further discoveries which will help complete a jigsaw puzzle of metal history for which the first pieces were fashioned more than 6,000 years ago.

In the middle of the dried-up river bed which joins Timna to the Arabah, a small hill remained unexplored in the great activity of the 1960s and 1970s which led to the identification of three major periods of early copper metallurgy in the area: the Chalcolithic period (4th millennium BC); the 14th-12th centuries BC when the Egyptians operated an important copper-producing industry in Timna; and in Roman times in the 2nd century AD.

Last autumn a team led by Professor Beno Rothenberg decided to take a look at the neglected hillock and scrambled to its top. There they found copper slag of a type which appeared different from that which is strewn in large heaps

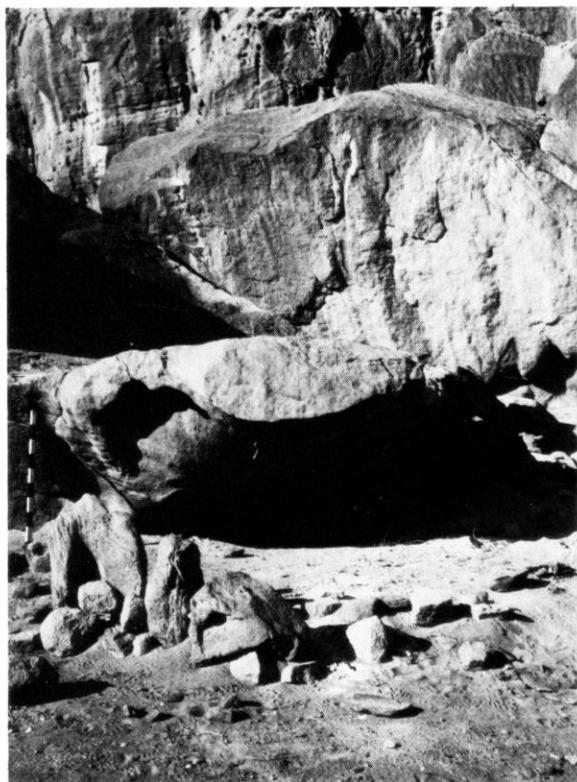
throughout the valley, a workshop containing some unusual crushing implements, mining hammers, crushed ore – and fragments of pottery the like of which had not previously been found in the Arabah.

The pottery has since been identified as belonging to the Middle Bronze Age 1 of the Levant, or the "Dark Age of the Near East", and is reminiscent of some of the bell-shaped vases of the Beaker culture which developed in the Iberian peninsula in the 2nd millennium BC and spread through the whole of Europe.

This is the first time that extractive metallurgy of this period has been identified in the Near East and its discovery is of considerable archaeological significance.



Stone tools from the workshop



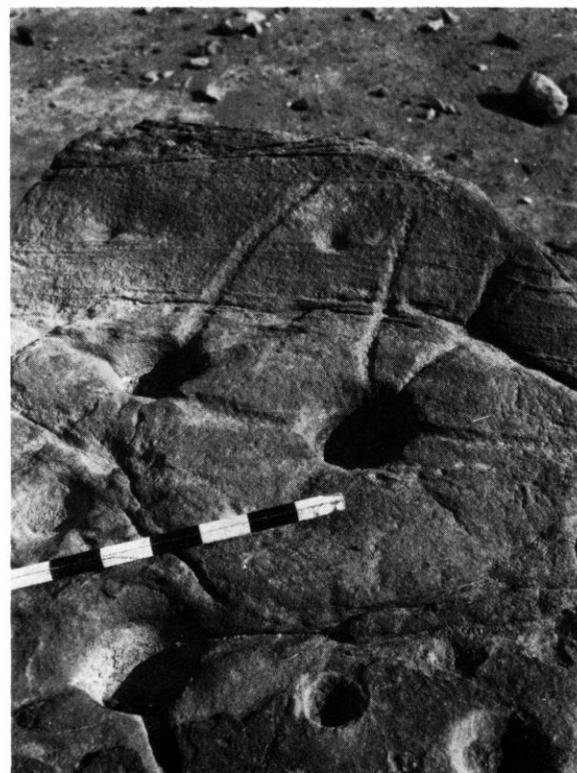
Chalcolithic pottery, flint tools and slag were found by this boulder near Timna's Egyptian mining sanctuary

Another discovery in the Timna valley throws new light on the religious cults and ceremonies associated with mining communities in the Arabah in ancient times.

When in 1969 Timna's Egyptian temple was discovered at the foot of "King Solomon's Pillars" in the centre of the Egyptian mining area, another

Right: Midianites put up this simple stele inside a cave on top of the Timna massif. A finely decorated jar of the 13th Century BC was found at its foot

Below: Rock carvings which depict the sun suggest the site of a Chalcolithic shrine



shrine was found high up on the mountain where an immense fallen rock had created a cave. Inside the cave was a *mazzebah*, or standing stone, carefully erected on a small altar. At its foot were complete, but broken pieces of a Mideanite jar, suggesting that the site was a place for worship or burial, of the Mideanites who were known to have worked with the Egyptians in the development of Timna's copper industry in the 14th-12th centuries BC.

Revisiting this shrine, the IAMS team looked around for further evidence of ancient worship and decided to investigate a large stone standing in the valley some 500 metres to the east. They climbed to its flat top and found its surface cut with lines radiating from the centre like the rays of the sun. At its foot were found copper slag, fragments of pottery and flint tools dating to the Chalcolithic period.

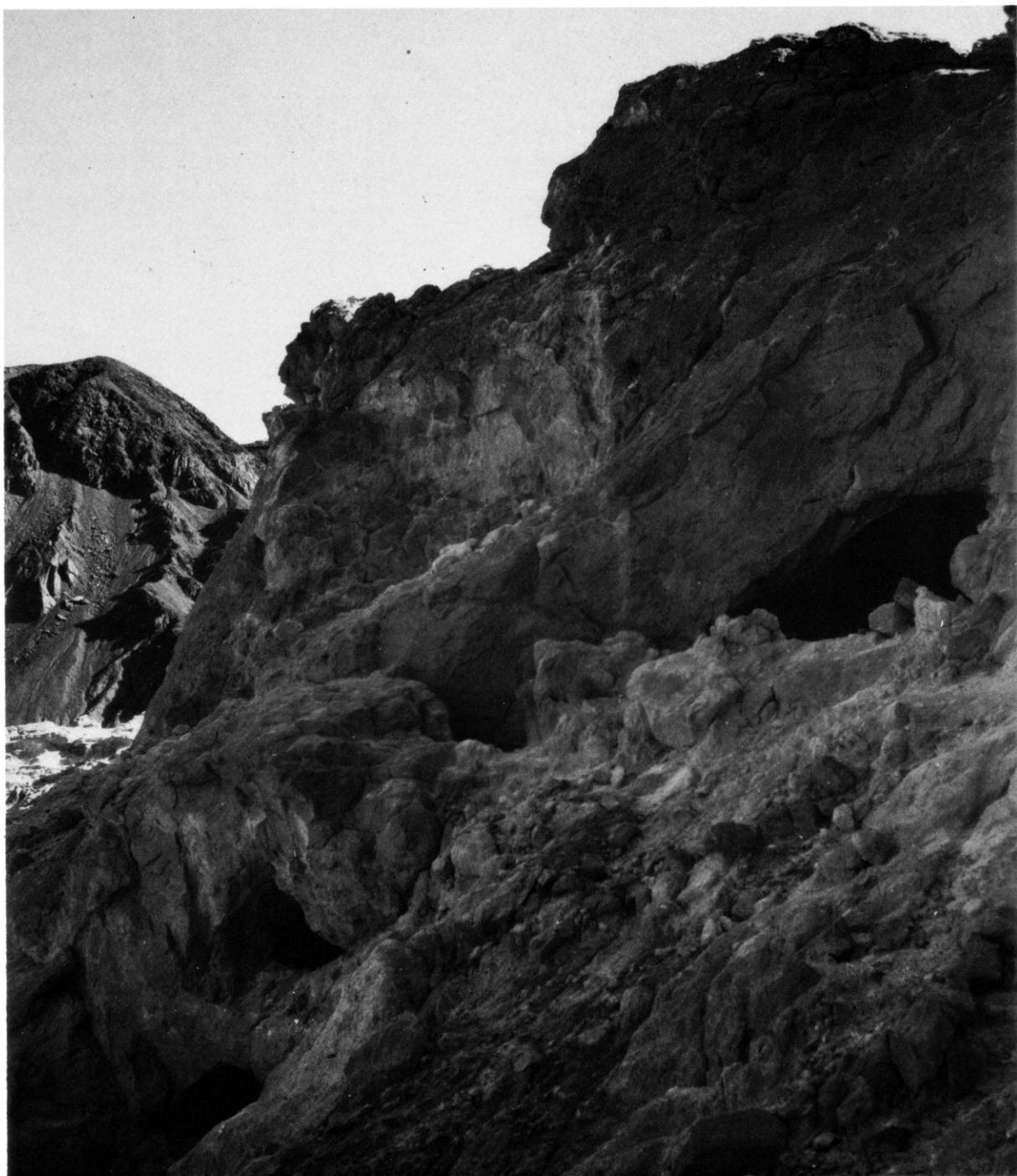
Fascinated by this massive stone and its strange markings, the team kept watch at dawn one morning and as the sun climbed above the rim of mountains above the valley, they saw that its first rays struck the stone in its centre.

Only a few kilometres from Timna is Wadi Amram, a great amphitheatre in the white sandstone, dominated by red Nubian pillars which resemble the columns of an ancient temple.

Here, above the floor of the amphitheatre which is still strewn with Roman pottery, the hills are pock-marked with caves and adits. It was already

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Newly discovered copper workings of the Roman period at Wadi Amram in the Arabah, 10 km north of Eilat

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known that the Romans extracted considerable quantities of copper ore from the Arabah and that this was smelted at a central treatment plant at nearby Beer Ora – the well is still in use today – which was within easy reach of an acacia forest for fuel. But until last year the Romans' mining methods had been only superficially investigated.

The IAMS team discovered a shaft on the top of a steep mountain which they followed for a distance of 10 metres to find that it connected with a large gallery, surprisingly empty of sand and the usual accumulation of rubble.

This is the first clear evidence of shaft-and-gallery mining by the Romans in the district. The mine was obviously a large one, extending to several levels, and its further exploration should provide

an interesting investigation into Roman mining techniques in this part of their empire.

In any comparison between the Roman and Egyptian industries in this part of the world, it must be remembered that for Egypt the Arabah was a major source of copper and that the mines were operated by specialists who were sent there solely for that purpose.

The Romans, on the other hand, were military conquerors and colonists: they had many things to do other than mine copper. Moreover, Rome already had larger and more accessible sources of supply, notably Cyprus and southern Spain, and it is unlikely that much of the metal which its legions produced in the Arabah was exported: most of it was for local use and there was little call for an elaborate organization or complicated techniques.