

IAMS smelting experiments featured in TV serial on metals history

Scenes shot in the Timna valley, Israel, in 1981 when a desert copper smelter was built and operated in a process identical to that followed by metallurgists who worked there more than 3 000 years earlier, are included in a new international television series on the history of metals.

Entitled *Out of the Fiery Furnace*, the film was written and produced by Robert Raymond at the invitation of Sir Roderick Carnegie, chairman of CRA Limited, Melbourne, Australia. The seven 50-minute episodes are narrated by Michael Charlton, one of the best known television commentators in Britain through his long association with *Panorama*.

Nothing is more inextricably involved in the daily life of 20th century man than metals. The modern world – even civilization itself – is built on a framework of copper, steel, aluminium and a score of other metals and alloys. Throughout history the control of metal resources has been a determinant of success or failure among nations and empires. And yet man has known and used metals for only a fraction of the time that he has inhabited the earth – for perhaps 10 000 out of the 2 or 3 million years that he has been using stone, wood, clay, bone and other natural materials.

Coloured stones

Stone Age man had come surprisingly far without metals. He had begun to cultivate crops, domesticate animals, build dwellings and was on the verge of establishing the first urban societies. Then – somewhere, somehow – he discovered that many of the coloured

Narrator: Michael Charlton



Producer, writer: Robert Raymond

stones he had been using for decoration could be made to yield new materials of almost infinite utility.

The growth of metal technology is one of the most significant developments in the history of mankind. It involves all people, everywhere. There have been many television series on science, the arts, exploration, wildlife, economics and many other aspects of the evolution of modern society. But never before has there been an attempt to tell the story of metals in one encompassing sweep.

The new series is based on exhaustive scientific and archaeological research, and took four years to complete. It was filmed on locations in all parts of the world, on sites where significant developments in the history of metals took place.

Timna's copperbelt

One such location was the Timna valley, site of what was probably the world's first great copperbelt, operated by Egyptian mining expeditions sent forth by the Pharaohs in the 13th and 12th centuries BC, and where too there is evidence of primitive copper smelting 3 000 years earlier in the Chalcolithic Period.

Here exploration by IAMS and its predecessor, the Arabah Expedition, had been going on since the 1950s: modern scientific study of ancient mining and metallurgy has developed largely from the important discoveries made over a quarter of a century by these teams in the field and by backroom boys in the laboratories.

In 1981, as part of IAMS's continuing post-excavation analysis of the Timna finds, experiments, using local ores and materials were carried out on the spot to demonstrate how copper was smelted towards the end of the Bronze Age.

Robert Raymond and his crew were present to film the trials which were performed by John Merkel, a young American, as the culmination of his doctoral research with IAMS and the Institute of Archaeology in London.



Flashback to 1981. The film unit was in the Arabah to capture the moment when John Merkel (in hat), using only materials which would have been available to the ancients, smelted copper in a primitive desert furnace

The cameras whirled as the furnace was fired and volunteers worked foot-controlled bellows to raise the temperature to the required level. They toiled all morning and into late afternoon under a blazing sun. In the end more than 1 kg of copper metal was recovered from "the fiery furnace" – and the name of a great international television serial was born.

Extensive research

In a foreword to the inevitable "book of the film" which is to be published shortly, Robert Raymond confesses that he was at first reluctant to accept Sir Roderick Carnegie's invitation to make the film: "Metals play such a pervasive role in modern life, and in fact have had such an influence on the growth of civilization, that it seemed almost presumptuous to consider even outlining the history of metallurgy in a television series . . . life was too short, I felt, to grasp even the fundamentals of such a vast subject in any reasonable time."

But Sir Roderick had already made some important dispositions. Before Raymond came on the scene he had commissioned Willard C. Lacy to travel the world and collect material on metallurgical history, and to identify relevant physical evidence and archaeological sites. Lacy, a genial but rigorous-minded American, had been a practising mining geologist before becoming Professor of Geological and Mining Engineering at the University of Arizona, and later Professor of Geology at James Cook University in Queensland, Australia.

"Bill Lacy's massive volume of research material, succinctly and lucidly expressed, made both the television series and the book possible," acknowledges Raymond. All his material has now been lodged with the

Mitchell Library in Sydney and the Latrobe Library in Melbourne for the benefit of future researchers.

CRA also provided Raymond with a panel of distinguished academic and scientific consultants, some of whom, when they read the draft scripts, were obviously concerned at the limitations which the television medium imposes on the telling of history, and in particular the denial of discussion, comparison and qualification. By its very nature, the television

Where to see the film

Out of the Fiery Furnace is being screened by the Australian Broadcasting Corporation starting on May 27.

The series has been sold to West German Television and for showing in the Middle East. Screening in Germany will begin in November. The film has also been bought by the Irish television authority but no dates for its showing have yet been announced.

When this issue of the Newsletter went to press arrangements had still to be finalized for screening the film in Britain and in North America.

The book was expected to be published, first in Australia, at the end of May.

treatment tends to suggest that events follow one another in a chronological line of development; that things happened first here, and then there; that someone must have been the "first" to make discoveries, whereupon others followed.

In fact, although the origins of metallurgy are still obscure, it is known to have developed not by a linear progression of individual achievements, but rather through scattered bursts of innovation and discovery against a broad, slow advance in technology. Whether or not an idea took root in any particular area seems to have depended upon whether society was ready to receive it and economically capable of developing it.

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History on film

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Important discoveries about the use of metals were undoubtedly made independently in many parts of the world, but only in some did they lead to higher levels of technology.

It is much to the credit of the producer and writer that both the film and the book tend to emphasize those concepts which favour independent discovery and innovation rather than the established ideas of diffusion. Diffusionists hold that the most significant advances



The film shows John Merkel stoking his "fiery furnace" in the desert smelting experiment at Timna

began in or near the "cradle of civilization" in the Near East, spreading thence across the ancient world. But in recent years a spate of archaeological and anthropological discoveries has mounted a serious challenge to the traditional view.

Whichever school of thought one may support, *Out of the Fiery Furnace* is bound to stimulate a greater awareness of the vital part that metals has played in the development of civilization and culture throughout the world. It should also provide first-class entertainment to millions of viewers.

Arsenical copper studies

The use of arsenical copper in ancient times before copper and tin were alloyed to produce bronze is being studied in a joint project by IAMS and Lehigh University, Bethlehem, Pennsylvania.

Arsenical copper is known from the early history of metals – in Spain as long ago as the 4th/3rd millennium BC. Natural alloys probably accounted for the first known occurrences: man did not learn to alloy copper and arsenic until much later, and it is likely that he discovered deposits when sources of oxidised copper

IAMS

IAMS as an international organization whose function is to promote, supervise and co-ordinate research into the origins and development of mining and metallurgy from earliest times.

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became more difficult to find.

At Lehigh the researches are being directed by Professor Mike Notis, head of the Department of Metallurgy, who is not only studying the properties and behaviour of the material but also seeks to discover why it virtually disappeared from use with the coming of bronze.

Additional copies of this Newsletter can be obtained from IAMS secretarial office, Institute of Archaeology, University of London, 31-34 Gordon Square, London WC1H 0PY. Telephone: 01-387 6052.

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