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IRON AND STEEL CURRENCY BARS IN ANCIENT GREECE

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ABSTRACT

The aim of this paper is to introduce new findings about the role of iron and steel in ancient Greece. Established interpretations are questioned in the light of new archaeological evidence and in the context of a theoretically informed analytical methodology. This work aims to provide an archaeological understanding of the physical processes and analytical studies related to some aspects of iron technology, and to demonstrate that recently developed analytical techniques when used in an archaeological context can revolutionize our understanding of the past.

KEYWORDS: Aegean Thrace, technology, bars, spits, *obeloi.*

METHODS

The iron artifacts discussed in this paper were discovered during the 1989 excavation of Messemvria-Zone, a small trading colony *(emporion)* on the Thracian coastline (fig.l). Iron spearheads, fragments of iron spits and an elongated bar of iron were found amongst pottery and artifacts of the late 6th century BC in a sanctuary dedicated to Apollo (Tsatsopoulou 1989).

After the systematic recording, measuring, photographing and drawing of the objects, pieces (<0.015m) were removed by a TS 8/ E Trim saw using the saw cat soluble cutting oil (typical dilution 3-10 % in water). All the sections were mounted in a FT fast setting resin that needs one to four hours to cool. The mounts were then wet grinded using three grinding papers (no 220, 500, 1200) and polished using the standard metallographic techniques of diamond polishing. A Rotosystem 250 machine has been used for both grinding and polishing of the samples. The polished sections were then etched in nitric acid in alcohol (NITAL with 2% nitric-acid and 98% methanol) and examined by both binocular and optical microscopes. The main body of the analytical work undertaken was contacted in the Metallographic Suite of the University of Strathclyde, Glasgow, Scotland, under the supervi-

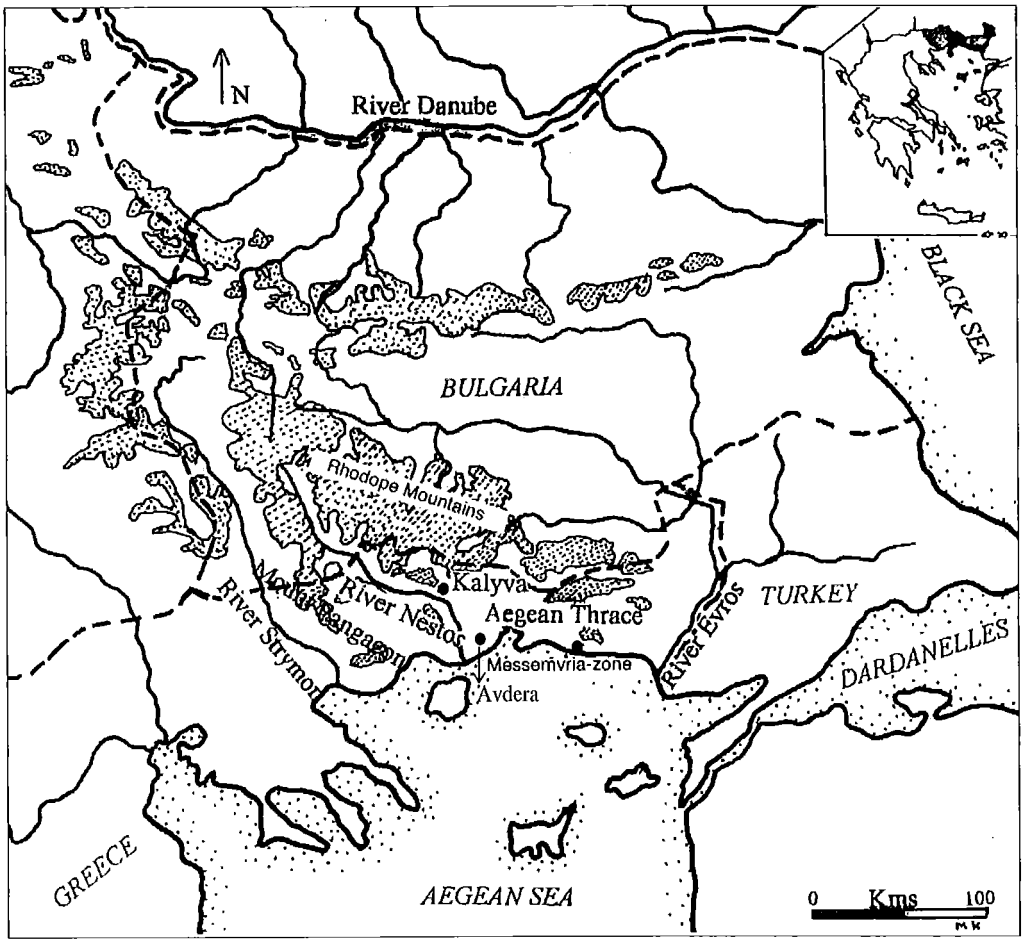

Fig. 1: Location map showing the area of Aegean Thrace and the location of Messemvria-Zone (schematic drawing by Maria Kostoglou based on Casson 1968).

sion of Prof. A. Hendry, and assistance kindly provided by the lab-technicians Mr. J. Kelly and Mr. D. MacMahon; mounting and processing of polished sections also took place in the laboratories of the department of Archaeology in the University of Glasgow under the supervision of Dr. R. Jones and Dr. E. Photos-Jones.

RESULTS

The Messemvria iron bar is 0.26m long, 0.45m wide, 0.017m tall and it weights 615.6 gr (fig. 2a). A cross section was removed from the left edge of the bar. That was examined under the metallographic microscope and the Scanning Electron Microscope with EDAX micro-analyzer.

The section showed a uniform distribution of big, amorphous ferrite grains with a lot of slag inclusions (fig.2b) indicating that the bar was forged from a single bloom. ferrite grains are slightly deformed on the edges due to hammering in order to give a bar shape to the bloom. Slag inclusions are elongated in the direction hammering. The chemical ana-

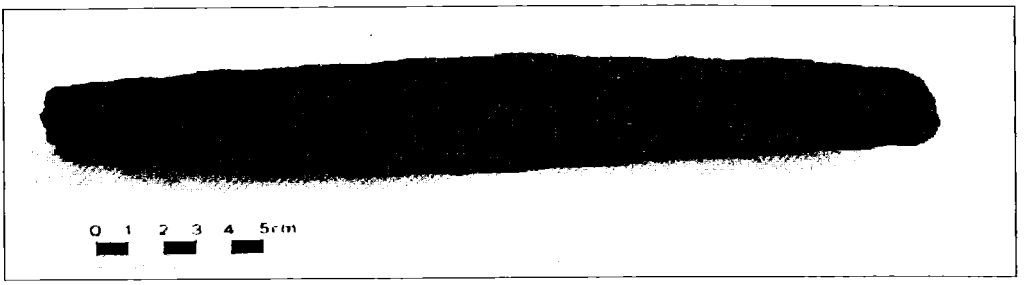

Fig.2 (a): Iron bar MES21.

lyses in the slag inclusions revealed a three-phase slag with globular wustite (97.46% iron oxide), plates of fayalite (an iron silicate rich in manganese oxide 2.09%) and interstitial glass (iron-silicon-aluminum silicate).

Manganese is a safe trace element for the Messemvria-Zone samples suggesting that the bar MES 21 is made 10cally from the smelting of manganese ferrous ores 10cated in close proximity to the site (Kostoglou 2002). The shape (elongated and flattened in order to be handled easier), the weight (almost that of a single

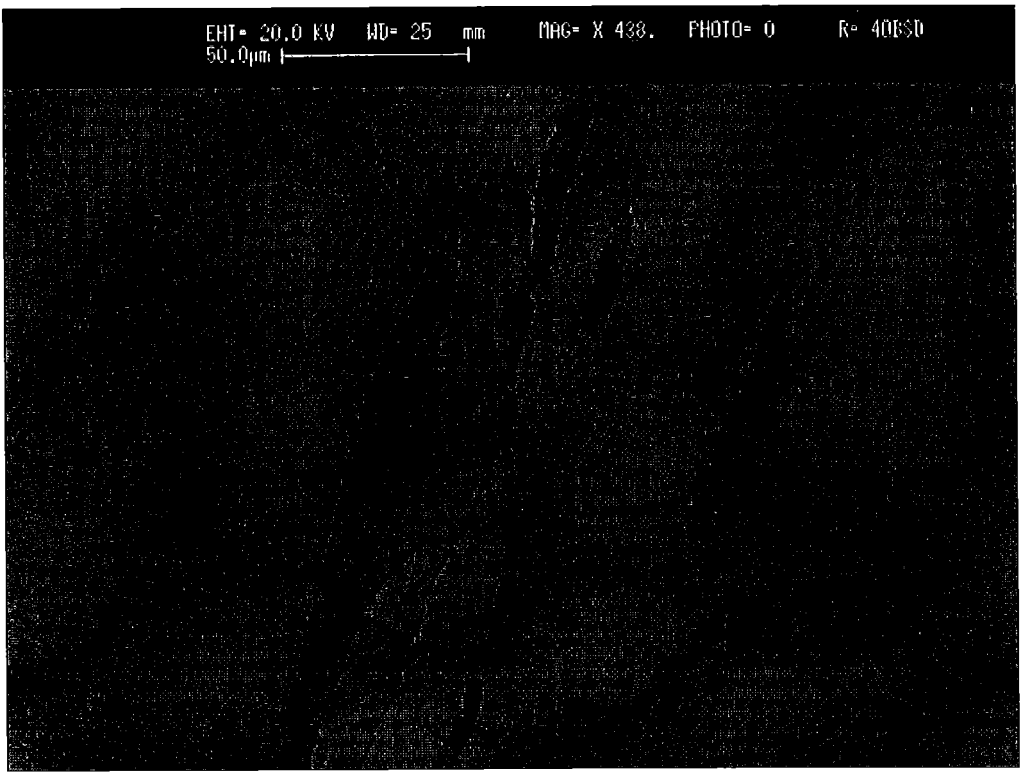

Fig. 2b: SEM photograph of iron bar MES 21 displaying large ferrite grains (white) and slag inclusions (grey).

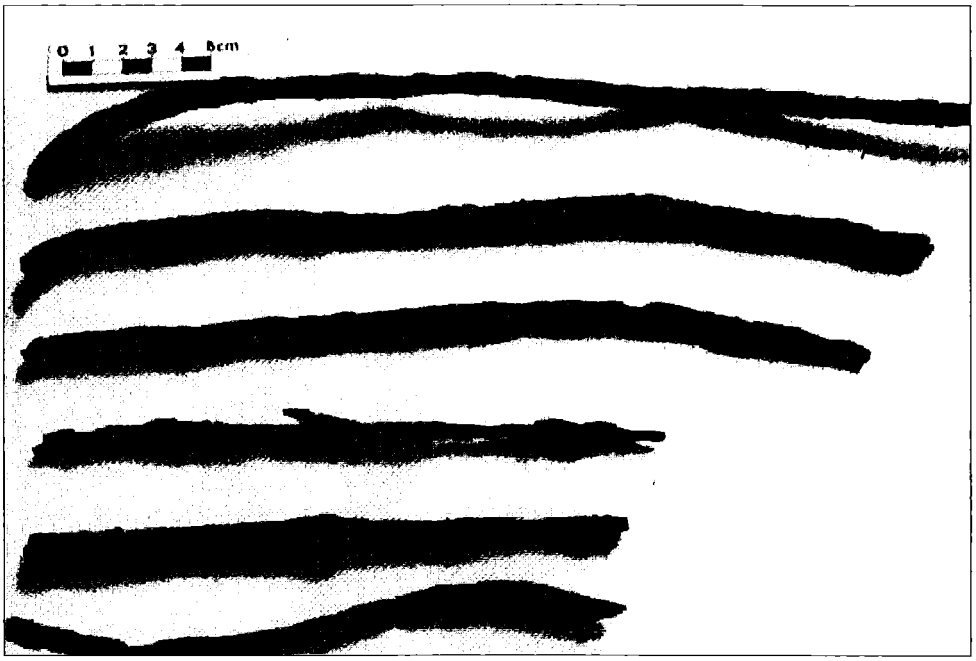

Fig. 3a: Fragments of 6 spits found in the Sanctuary of Apollo. MES 31 is the third from the bottom.

bloom) and the context (votive, in the same group with the spits) suggest that this is not a simple iron bar but a semi-finished form of iron that could be traded/exchanged, probably a currency bar. Until more evidence of this kind appears, this has to remain the single currency bar of wrought iron in ancient Mediterranean.

A total of 6 spits (fig. 3a) were also studied. ll the samples examined displayed steel microstructures and the best example is depicted in figure 3b. The spits analyzed were made by welding and then twisting 10w carbon steel to high carbon steel.

In order to check if this was the case with all spits another four samples from the ancient settlement of Avdera, a Greek colony on the Thracian-coast (fig. l) were also anal used. The vdera spits were found in a domestic context (within houses) during the excavation of the Classical settlement. They are made not from steel as the Messemvria ones but from wrought iron with a 10t of slag inclusions (Kostoglou 2002).

DISCUSSION

Various objects of different shapes and sizes were used in different parts of the world to give to the bloomery iron (produced in a smelting furnace after the reduction of ore and with the use of fluxes) a marketable form. Thus, bars, flattened balls or plates were used in Europe, Asia and Africa (Rostoker and Bronson 1990, 96). The best-known analyzed examples are the sword type bars of pre-roman southwestern England (Tylecote 1987,206-208). Most of these finds are in use in the Middle ages and they are made of steel. Quality control takes the form of a deep incision to expose the metal in the interior of the bar. With regards to wrought iron, Crew (1994) has argued that the quality of iron was tested by taking bar of iron and forging one end into a socket shape in order to demonstrate that the metal could be successfully forged and welded.

Although iron and steel currency bars, as a standardized form for storing and trading iron,

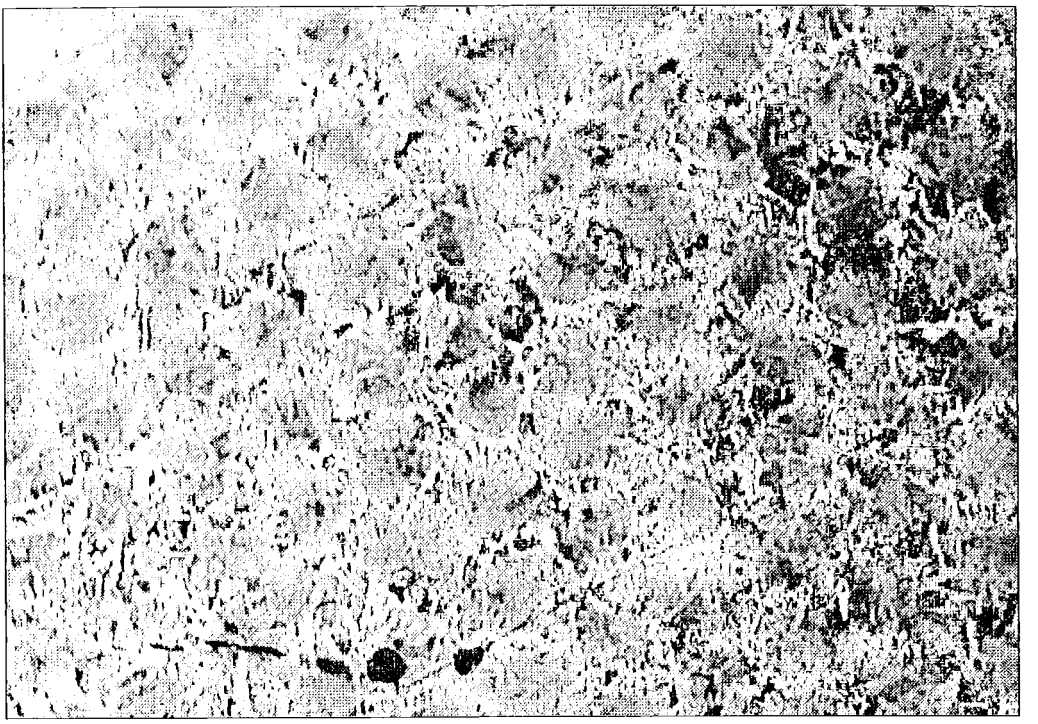

Fig. 3b: Microphotograph of spit MES31 x264 displaying hypper-eutectoid steel structure with pearlite (gray) and cementine around the grain boundaries (white).

are often found in Central and North Europe, they are not a common find in Greek and Mediterranean excavations. There is no evidence for currency iron or steel bars in the Mediterranean during the first millennium BC (Tylecote 1987, 255). The only forms of iron currency in Greek context are the spits, known as *obeloi* in ancient Greek literature. However, spits found in archaeological contexts are understood as a form of coinage money (Pleiner 196) and they are not discussed in terms of their technology or trade value. This interpretation is based mainly on textual evidence and current research suggests that there is öø sound archaeological evidence to support the textual tradition. â. Haarer (2001) examined more than 1000 spits from various locations in ancient Greece and covering a Period from the 9th to the 5th centuries BC. He concluded that archaeology, texts and iconography, strongly support the argument that spits were everyday common items and there is no evidence to support that they were used as a form of pre-coinage money.

The analysis of spits and elongated bar found in the same archaeological context offer a new methodological way to answer the question about how iron and steel were stored, traded/exchanged for their value as metals and not as pre-coinage money. On the basis of the previously presented analytical evidence, a clear differentiation emerges: the Messemvria-Zone spits seem to be of special value and use because they are found in a ritual context (votives in the sanctuary of Apollo) and they were made of good quality steel. The Avdera spits found in a domestic context (houses) and they were made of wrought iron because their use –roasting– did not require any of the properties of the steel.

CONCLUSIONS

On the basis of new archaeological and analytical data, this paper suggests that the iron bar probably forged from single bloom was the marketable form for the storage and circulation of wrought iron in ancient Greece at the end of the archaic Period (6th century BC). The spits, more easily carbunised to steel due to their 10ng and thin shape, were used as steel currency bars. Furthermore, an interesting correlation between steel spits found in ritual context and wrought iron spits found in domestic context is evident in Aegean Thrace. Finally, semi-finished forms of iron, such as the elongated bar MES21, point out to the fact that our knowledge on early iron in Greece is based on limited archaeological finds and on even fewer properly analyzed material. Although, more analytical work is needed before extrapolating this results to the rest of Greece, it could be safely concluded that the different technological, economic, artistic or symbolic uses of iron in Greece can not be fully appreciated before iron technology is analyzed in its own terms.

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