A Western Iberian Cassiterite Survey 1992-96

This article is a short review of the archaeo-metallurgical survey work which formed the basis of my PhD thesis presented at the Institute of Archaeology, University College London in January 1996.

I decided on tin as the subject for my PhD field survey work in 1992 since tin was a metal used in antiquity which had not been properly dealt with compared to the amount of research and fieldwork that had been invested in the provenance and production techniques for gold, silver, lead, copper and iron within the Iberian Peninsula.

The geographical and geological region I chose to work in was Mid Central-Western Iberia, including cassiterite ore sites in Spain in the provinces of Badajoz, Caceres and Salamanca and ore sites in Portugal in the provinces of Beira Alta, Beira Baxia and Upper Alentejo.

Cassiterite, the major tin ore used in antiquity in the Iberian Peninsula, appears almost exclusively within the Centro-Iberian Zone granites. The Centro-Iberian Zone granites run in a curved arch from the north-west corner of the Iberian Massif in the province of Galicia down to the Andalusian province of Jaen. The Central-Iberian granite zone contains important mineralizations of Sn, W, U, Cu, P, Li, Zn, Sb, and Au. The major deposits of Iberian cassiterite ores appear mostly within the central and northern regions of the granites. The field survey work which I undertook included only the central region granites.

A total of 42 sites were visited, some of the sites were visited only once, others were revisited each year as the survey work progressed.

A reference for choosing sites to visit was the geological listing of cassiterite mines that were still working or had recently ceased to work (Dallmeyer, Garcia, eds, 212-19). I visited primary vein mines where possible since alluvial worked sites would not really provide much identifiable archaeo-metallurgical surface evidence.

During the survey, I soon realised that it would be very difficult to locate some of the mines as they had not been worked for years and local knowledge of the location of what were very small mine workings was very meagre.

The sites were visited with the hope of locating remains of cassiterite ore veins or fragments of ore samples, archaeo-metallurgical surface remains such as mining or crushing implements, furnaces, casting or mould fragments, metal objects or fragments, slags and pottery.

The most important sites were:

No 4. El Cerro de San Cristobal, Logrosan, proved to be the most rewarding of all the sites visited, for both its archaeo-metallurgical and Late Bronze Age settlement remains. Vicente Sos Baynat, a geologist working in the Logrosan area in 1950 to 1960, made a collection of archaeological artefacts which he presented to the National Roman Museum, Merida. Some of these artefacts strongly infer that El Cerro de San Cristobal was also settled in the Iberian Copper Age approximately 2000 BC.

No 42. La Mina de Berrocal, also was a site with numerous probable mining surface remains (hammers and crushers) and Copper Age settlement pottery.

No 16. Mina Golpejas produced a mineral containing both Cu and Sn. In a series of laboratory experiments I was
High-Tin Bronze Mirrors of Kerala, South India

High-tin bronze (copper with 20-30% tin) has been used in various ancient cultures to make mirrors. This alloy, also known as speculum, has a bright reflective surface when polished. In Ancient China, decorated mirrors were widely made from the Chou dynasty onwards for cosmetic, decorative, and other uses. Typical Han Chinese mirrors were often cast from lead high-tin bronze with about 25% tin and 5% lead (Meeks, 1993). There are examples of mirrors from the Roman world which were also leaded high-tin bronze. A variation during Roman times utilized low-tin bronze alloys, but with a tin coating on the reflective surface. Mirrors in antiquity represent a special class of metal object requiring specific metallic properties. In addition to technical studies of ancient mirrors, observations of traditional metallurgical crafts may also be used to increase our understanding of mirror production using high-tin bronze alloys.

A distinctive traditional process for making cast, high-tin bronze mirrors exists in several small villages in South India. The process received little attention from archaeologists, anthropologists, or metallurgists, until the first publication of the process by Mukherjee (1978). There are, however, many aspects of this specialized traditional craft which were not considered at that time. As this traditional craft may yet vanish, the opportunity was taken to observe and document the process recently in the Alleppey district of Kerala. There still remain several small, specialized groups of metal craftsmen utilizing the distinctive material properties of high-tin bronze to produce mirrors as well as bells, musical instruments and wrought vessels. Such utilitarian objects of high-tin bronze also appear to have been commonly used in Ancient India, so study of the traditional craft adds an additional perspective for the archaeological mirrors.

The metals craftsmen at the village of Aramula in the Alleppey District of Kerala, about 15 km from Changanur on the banks of the Pambiyar river, were visited on several occasions in 1992-93. Most helpful was Mr A. Gopalakrishnan (Fig. 1), one of the few artisans who still carries on this traditional craft, which he claims has been in danger of dying out altogether. Economically, it was the interest of foreign tourists at a nearby ashram (religious commune) which has helped revive the craft. Mr Gopalakrishnan makes polished high-tin bronze mirrors mounted in brass handles. The high-tin bronze mirrors,

Fig. 3. El Cerro de San Cristobal. Site No. 4. Bronze monkey or dog (?). Sos Baynat collection National Roman Museum. Merida. Scale 1:1.