ABSTRACT: A selection of 37 Song dynasty Chinese cast iron coins was subjected to metallurgical analysis. From inscriptions, these are dated between 1078 and 1215 AD, and the mint locations of 23 of the coins are known. All were found to be white cast irons, but they separated into two types, one with relatively high levels of silicon, phosphorus and sulphur and divorced eutectic microstructures, and the other with low levels of these three elements and ledeburitic microstructures. Those coins that were minted in Shaanxi were all found to be of the first type, while those minted in the Hubei/Anhui region to the southeast are all of the second type. On the basis of sulphur content it is believed to be likely that iron used for the first group was smelted in coal- or coke-fired blast furnaces, while the iron in the second group was smelted using charcoal. This is in general agreement with what is known of the iron industry in China during the Song period.

Introduction

Analysis of objects from the past is often useful in providing information about aspects of life in earlier times and in this regard studies of coins have particular advantages. The date and location data they can convey, combined with the results of metallurgical analysis, have the potential to offer information that is important and relevant far beyond the field of numismatics. In the present work the main concern is with metallurgical and processing issues.

Here a selection of 37 Song dynasty cast iron coins from the collections of the Department of Coins and Medals, British Museum has been subjected to metallurgical analysis. The coins range in date from the eleventh to the thirteenth centuries AD, but it is possible from the coin inscriptions to establish to within a few years the dates of the individual coins and in some cases to determine the locations of the mints where they were produced. Although based on a limited number of coins, the study allows an initial investigation of the production processes of cast iron and of iron coins, including chronological and geographical differences. These touch on specific questions, relating to:

- the characteristics of the cast iron used for coinage
- the iron production processes used
- the technology of coin production operations, including any heat treatment and/or mechanical processing carried out after casting
- chronological, geographical and mint variations among the coins
- comparison of Song dynasty coin-casting technology with contemporary Chinese non-coin cast ironwork.

Of course, metallurgical analysis of a much larger number of coins would be necessary to address these questions comprehensively; furthermore the methodology could potentially be extended to include issues such as comparisons with cast iron coins and non-coin ironwork from other regions of East and Southeast Asia.

This paper presents the Song dynasty coins in historical context, and the results of their analyses along with a discussion of those results and their possible significance.