Scientific Investigations on Roman Silver Coins of the Emperor Trajan (AD 98–117)

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The rule of the Roman emperor Trajan (AD 98–117) has always attracted specific interest among financial historians, since written sources provide us with several important pieces of information concerning the finances of the state during his reign. Therefore, the Trajanic period may be regarded as one of the key periods for the modern understanding of the economy of the Roman principate in general. The estimation of the relative proportion of major elements provides valuable information on changes in monetary theory, economic changes and materials technology. In the past these investigations had to be carried out on the surface of the coins, since they were done on pieces from museums’ collections. However they were not all reliable because of the phenomenon of corrosion, which is frequent with ancient objects. Therefore, the determination of the chemical composition of the coin’s core is essential, which means that either sample material has to be taken or the coin has to be cross-sectioned.

Within an interdisciplinary project, a group of 68 silver coins (denarii) of Trajan, evenly distributed over the entire span of his reign (2nd to 6th consulate), as well as 3 coins from the reign of his predecessor, the emperor Nerva (AD 96-98), were acquired on the coin market. These pieces could be cross-sectioned in order to carry out analyses. In this way, it was possible to correct the results of earlier work done on Trajanic coins and to provide, for the first time, a secure basis of data for the investigation of the development of the silver alloy used for denarii in Trajan’s reign. The cross-sections have been analysed so far by micro X-ray fluorescence analysis (µ-XRF), scanning electron microscopy with energy dispersive X-ray spectrometry (SEM/EDX) and synchrotron micro X-ray fluorescence analysis (SR-XRF).

Results

In this project, a marked decrease in the silver content of the alloy of Trajan’s denarii between the years AD 99 and AD 100 could be observed: While the standard silver coins (with Latin legends) of the emperor’s second consulate (AD 98-99) contain approx. 87% silver and 13% copper on an average, the silver content was reduced to about 79% in the coins of his third consulate (AD 100). This was only the standard Roman mithridate adhering to the following period, until the end of Trajan’s reign (AD 117).

A closer look at the historical background helps to explain the drastic change in the composition of the alloy: When Trajan came into power in January of the year AD 98, he did not stay in the empire’s capital city Rome, but in Germany, being the governor (legatus Augusti pro praetore) of the Roman province of Germania superior at that time. After his accession to the throne, he did not immediately go to Italy, but remained in the northern provinces of the Imperium Romanum for almost two years. He traveled along the Rhine and the Danube together with his staff, inspecting the troops of the Roman frontier provinces. It was only in the late autumn of AD 99 that Trajan entered Rome for the first time as an emperor. In AD 101, he left the capital again for a military campaign against the Dacians (in today’s Romania), for his “First Dacian War”, which ended with a Roman victory in AD 102. The results of our metallurgical analyses tie in well with these facts: The silver content of the denarii was reduced in AD 100, precisely when Trajan was in Rome for the first time during his reign. In this period, intense preparations for the Dacian campaign were doubtless being carried out. The Roman mint’s scope in reducing the silver content of the denarii surely was to save money and to relieve the state’s budget. Whether the potential influx of precious metals into the Roman treasury after the Dacian campaigns had any repercussions on the composition of the denarius alloy has not been ascertained. However, marked differences in the gold and lead concentrations have been found between the COII and COIV, which indicate a possible change in the source or sources of metal used.

1. Austrian Science Fund Project P17462, Finanzgeschichtliche Aspekte der traianischen Münzprägung.