

## The weight of the Græco-Bactrian chalkous

The Greek kings of Bactria secured their independence when the satrap Diodotus revolted from the Seleucids c. 250 BC and proclaimed himself king. As a Seleucid successor state, independent Greek Bactria retained many features of Seleucid administration and was influenced by developments in the Seleucid empire. It continued to use the Seleucid monetary system based on the Attic weight standard with gold staters weighing c. 8.4 gm., silver tetradrachms c.16.8 gm., drachms c.4.2 gm. and a range of subsidiary bronze/copper denominations. In his study of the Greek and Indian monetary systems Cunningham (1884, 311-312) weighed 145 Seleucid coppers. Allowing for the wide range of actual weights to be expected in copper coins he concluded that the chalkous or copper unit was the same weight as a silver drachm, and the tetrachalkon (or coin of 4 chalki) was about the same weight as the silver tetradrachm. Babylon (1890, clxxxii- clxxxvi) saw a similar correspondence between the weights of Seleucid silver and bronze denominations, but thought the basic bronze unit, the chalkous, had a theoretical weight of 8.6 gm.. Newell (1938, 270-274) saw recurrent ratios of 1:2: 4 etc. running through the weights of the Seleucid bronze but was content simply to apply the term "unit" to the denomination he thought the most common. This terminology has been adopted by Bopearachchi (1991, 27) in his catalogue of the Græco-Bactrian coins in Paris and a modified form of this neutral terminology has been adopted by Houghton and Lorber (2002, 1-4) in Part I of their recent Catalogue of Seleucid Coins.

There are few marks of value on any coins in antiquity. But on one group of bronzes struck by Antiochus IV (175-164 BC) there is a series of value marks - **A X** (1 chalkous) on bronzes weighing about 4 gm.; **B X** (2 chalkoi) on bronzes weighing about 8 gm.; and **Δ X** (4 chalkoi) on bronzes weighing about 16 gm. at the mint of Seleucia on the Tigris. The mark of value **A X** (one chalkous) is also used on bronzes of about 4 gm. by Antiochus IV at a mint in Phoenicia. Schlosser (1985, 34-35) argued that

these marks of value on bronzes were related to the weight of the slightly reduced silver tetradrachm of 16.80 gm.; and he strengthened his argument with the results of a linear regression analysis which demonstrated this denomination-weight relation. (Schlosser, 1989, 70-72). He went on to show a similar relationship at the royal mint of Antioch from the time of Seleucus I, whose silver tetradrachm had been slightly heavier at 17gm. But this has not settled the argument. In a major study of the bronzes of Antiochus IV, Le Rider (1994, 24-25) has asked the basic question why were marks of value used by Antiochus IV at all? There are three possibilities. The marks may indicate that the weight of the chalkous:

1. remained at 4 gm. after the slight weight reduction of the silver in 173-2 BC or
2. was reduced by half from 8 gm. to 4 gm. or
3. was doubled from 2 gm. to 4 gm.

There had certainly been bronzes of 2, 4 and 8 gm. under earlier Seleucid rulers, but there is no clear evidence which bronzes of 2, 4, or 8 gm. had been called a chalkous.

There is the further puzzle that under the same Seleucid king Antiochus IV the same marks of value **A X**, **B X**, and **Δ X** had been used on bronzes weighing 3, 6 and 12 gm. Respectively at the mint of Nisibis. It is clear that the Seleucid bronze coinage, as other bronze coinages in antiquity, had been struck *al marco* and not *al peso*. Even so the weights of coins that seem to represent the same denomination cover a remarkably wide range and Krittr's detailed analysis was obliged to conclude that the Seleucid bronzes must have had a remarkably wide chronological and geographical variability.

All these studies of Seleucid bronze metrology, including the immensely valuable raw material assembled by Krittr (Houghton and Lorber, 2002, 5-36), are based on the weights of bronze coins without paying regard to the differing composition of the alloy in which they were struck. Although Caley (1939, 335-345) has published

analyses of a large number of Greek bronze coins, these include only six bronze coins of the Seleucid period - of Antiochus II (261-246), Antiochus III (222-187), Seleucus IV (187-175), Demetrius II (146-138), and Antiochus VIII (121 and 114). He did however establish that the composition of Seleucid bronzes was similar to that of contemporary bronze coins throughout the Hellenistic world and that there are systematic changes in composition according to the time and place of manufacture. In the earliest bronzes copper and tin alone were used. The latest coins have a substantially higher proportion of lead, and the tin component seems to be lower in proportion to the distance from Rome. Whereas there had been 12-14% tin in the later fourth century BC bronzes from Macedon, it had dropped to 8% under the Seleucid king Antiochus II and 6% under Antiochus III and Seleucus IV.

Tin was substantially more expensive than copper and lead. The accounts of the Hephaestasion at Athens (Melville Jones, 1993, 106-107 and Le Rider, 1994, 29-30) record the cost of a talent of copper as 35 drachmae and of tin as 230 drachmae while lead was a much commoner metal, cheaper than copper. One surprising and unexpected result to emerge from the recent analysis of some Græco-Bactrian and Indo-Greek "bronzes" by Cowell (1986, 335-345) in London and Barrendon with Nicolet-Pierre (1989, 65) in Paris is that they contained no tin but consist of almost pure copper (except for the cupro-nickel coins). We should therefore be more precise in our terminology and call the Seleucid Aes coins "bronzes" but refer to the Bactrian and Indo-Greek Aes coins as "coppers". The composition of the alloy of bronze/copper coinage at different periods and in different locations inevitably affects the cost of production and the value of metal in the coins concerned. Account must be taken of this. Whereas the cost of a talent of alloy had been c. 60 drachms for the Macedonian bronzes, it had dropped to 52 drachms for the bronze coin of Antiochus II analysed by Caley, 46 drachms for the bronzes of Antiochus III and Seleucus IV and 35 drachms for the Græco-Bactrians coppers from the time of Euthydemus I and for subsequent Indo-Greek coppers. While Kritt's analysis of the metrology of the Seleucid bronzes, based on weights alone, has established the local character and the chronological and geographical variability of the Seleucid bronzes, some of the more surprising variations may eventually be explained when proper account is taken of changes in alloy composition as well as differences in weight.

Numismatists have tried to establish the weight of the chalkous in the Græco-Bactrian coinage from Seleucid practice. Diodotus I and Diodotus II certainly copy the pattern of the denominations of the Seleucid king Antiochus II. The coppers of Euthydemus I of Bactria and his successors contained no tin but continued to use the same basic weight patterns of 4 and 8 gm. Demetrius I adds multiples at 12 and 24 gm. Antimachus Theos continues with the 8 gm. denomination, as does Eucratides. The earliest Indo-Greek kings, their successors who ruled the provinces south of the Hindu Kush, developed their own distinctive monetary system with a weight standard in silver and copper intended to succeed and to be complementary to the earlier Indian coinages they encountered in India. Their coinages introduced Brahmi or Kharoshthi legends in addition to Greek to make them intelligible to their new subjects. But they continued to use silver of high purity 98-99% fine, as in Bactria, with small change struck in virtually pure copper, as the Græco-Bactrians had done. Although the Indo-Greek kings had introduced a new Indian weight standard for their Indian coinages, they retained the Attic / Seleucid/ Bactrian denominational relationship in which 8 chalkoi were worth one obol. Menander, the junior contemporary of Eucratides (c. 170-164 BC) introduced a series of denominational marks on his copper coinage in the second part of his reign (Mac Dowall, 1975, 39-52). His coppers with different obverse and reverse types for each denomination were marked with Greek letters or numbers -

- A ie I on coins c. 2.75 gm.,
- B ie. 2 on coins of c. 5.5 gm.,
- Δ ie. 4 on coins of c. 11 gm., and
- Θ ie 8 or H (the eighth letter of the Greek alphabet), and sometimes A on coins of c. 22 gm.

It is a carefully planned system in which the Greek letters correspond numerically to the weights of the four denominations and the use of alpha (or less commonly theta and eta) on the 22 gm. denomination gives the key to the names of the copper denominations used - the Greek nomenclature of chalkoi in the Attic system in which 8 chalkoi = 1 obol. The early Indo-Greek kings Apollodotus I and Antimachus Nikephorus had been obliged to introduce a lower Indian silver weight standard of 2.5 gm. to provide a currency that would circulate alongside the pre-existing Mauryan punch marked silver. Menander sought to introduce a Greek-type denominational system

with an Indian copper chalkous, in the same basic relationship to the Indian silver drachm as the Bactrian copper chalkous had to the Bactrian silver drachm. At this period both the Bactrian and Indian drachms were struck in excellent quality silver - 98 to 99% fine: and the composition of the coppers in the two systems was also very similar, consisting of virtually pure copper with no admixture of tin.

It follows that we should be able to use the evidence of the weight of Menander's copper chalkous in India to calculate the weight of the copper chalkous of the Graeco-Bactrians in Bactria. The Bactrian silver drachm at c.4.0 gm was some 1.6 times the weight of the Indian silver drachm of Menander at c.2.5 gm. The Bactrian copper chalkous should therefore have weighed about  $2.75 \text{ gm} \times 1.6 =$  somewhere about 4.4 gm.. Copper and bronze denominations were struck al marco and these calculations involve many approximations, but the results clearly point to a Bactrian chalkous of 4+ gm. rather than a lighter 2+ gm. or a heavier 8+ gm. The weights of the Bactrian denominations had remained basically the same from the time of Diodotus to Eucratides. The weight of the coin denominations of Diodotus moreover were derived directly from those of his Seleucid predecessors - Seleucus I, Antiochus I and Antiochus II - a period substantially before the time of Antiochus IV (175-164 BC). This clearly indicates that the Seleucid chalkous - at least in the east - had originally been a coin of c. 4gm. before the time of Antiochus IV; and the marks of value used by Antiochus IV at the mint of Seleucia on the Tigris - **AX**, **BX**, and **ΔX** were intended to reaffirm the existing value of the 4 gm. denomination as a chalkous, the 8 gm. denomination as a dichalkon

and the 16 gm. denomination as a tetrachalkon, notwithstanding the minor reduction in the weight of the silver tetradrachms and drachms in 173-172 BC.

Without a series of metallic analyses it is not clear whether the lower weight pattern seen at Nisibis and elsewhere was due to the use an alloy with a higher tin content or simply a variety in weight for standard denominations that may have developed in the usage of different mints and been acceptable in the limited region served by the mints manufacturing bronze coins. But it seems clear that at Nisibis, as at Seleucia and in Phœnicia the use of marks was not changing the value of the existing denominations.

Todd (1946, 47-62) has reminded us that "chalkous" is probably an adjective qualifying an unknown masculine noun. In popular usage it came to denote a copper or bronze coin, but was not in itself the official name of any specific denomination or weight of coin in the Greek world generally. It could in fact refer to any copper or bronze coin or coinage in general. By the time of Antiochus IV, however, it did refer to a particular Seleucid denomination, the bronze coin that normally weighed about 4 gm.

Whereas numismatists from the time of Cunningham have tried to deduce the name of the denominations of the bronze/ copper coins of the Greek rulers of Bactria from Seleucid practice, we see that they can more securely be established from the marks of value on the copper denominations of Menander the Indo-Greek king. This in turn throws light on the weight of the denomination that was called "chalkous" under the earlier Seleucids.

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MARKS OF VALUE ON THE BRONZE COINS OF ANTIOCHUS IV				
Gm.	Seleucia on the Tigris		Phoenicia	Nisibis
22				
20	△			
18	△△			
16	△△△△△	(16 gm)		
14	△△			
12				△△△ (12 gm)
10				△
9	BB			
8	BBB	(8 gm)		
7	BBBB			
6	BB		A	B (6 gm)
5	AA			
4	AAAAAAAAA	(4 gm)	AAAA	A (3 gm)
3	AAAAA		AA	
2				