ROYAL COINAGE IN HELLENISTIC BACTRIA

A die study of coins from Euthydemus I to Antimachus I

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Abstract

The history of Hellenistic Bactria (northern Afghanistan, and areas of Tajikistan and Uzbekistan) is particularly obscure and its reconstruction contentious. Unlike other Hellenistic kingdoms very little evidence survives from literary sources and inscriptions; the best primary source is the large quantity of coins issued under the Graeco-Bactrian kings who ruled the area from the third century to the mid first century BC. With limited details of the find spots of the coins and only a few published hoards, their use has often been limited to a superficial analysis of their iconography.

This thesis presents the results of a die study, an approach to studying the coins that can give many insights into the way they were produced. The coins of six kings (Euthydemus I, Demetrius I, Euthydemus II, Pantaleon, Agathocles, and Antimachus I) are included. Different mints and rhythms of production can be identified, and the overall size of the coinages estimated. Using a thorough understanding of their production this thesis proposes a new, soundly-based, history of the Graeco-Bactrian kingdom under these kings.

For Rosie

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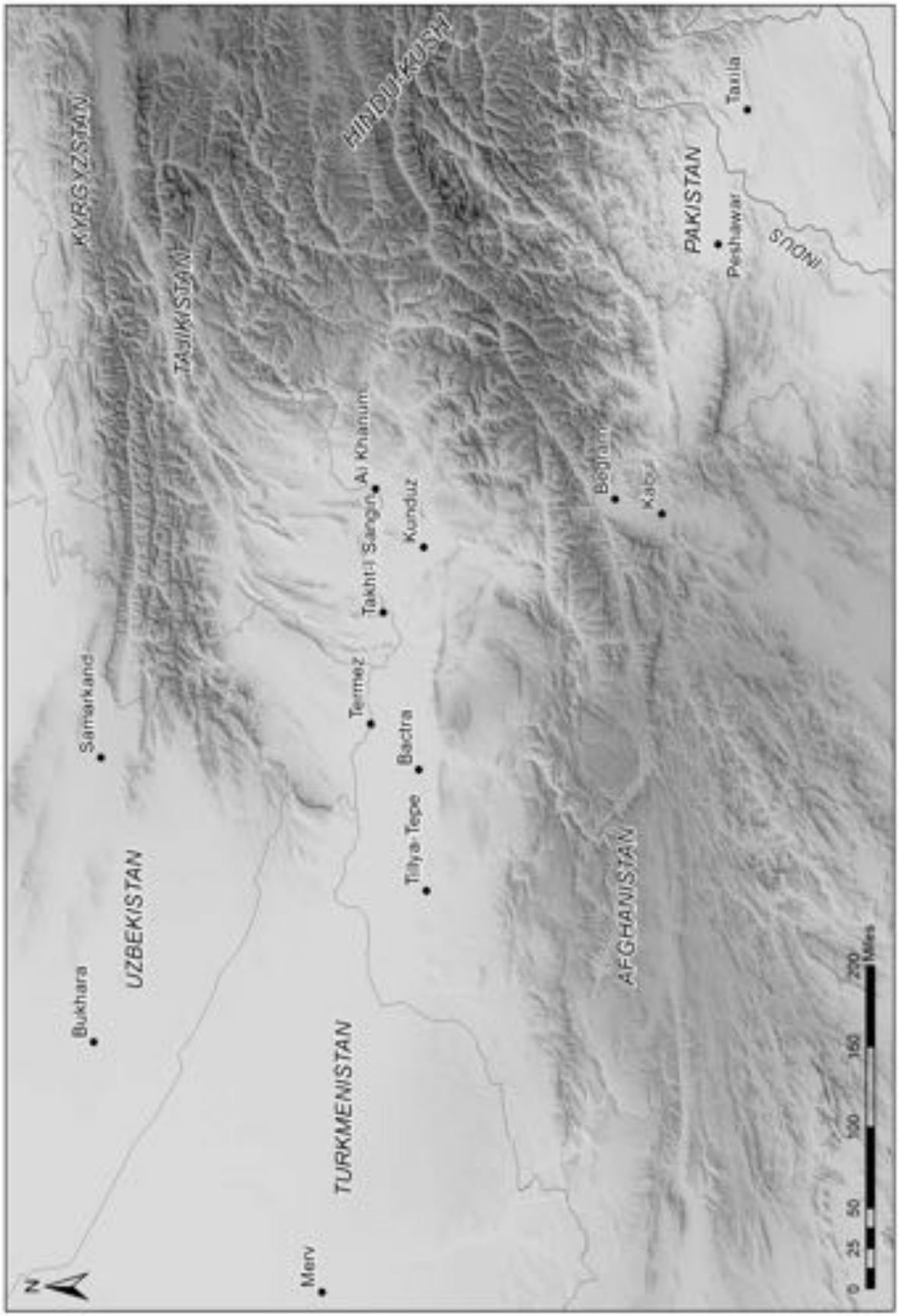

Figure 1: Map of Central Asia

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Abbreviations used in text

D	Number of dies used in the production of a coinage (unless otherwise stated calculated with Esty (2011) formula.
d	Number of dies identified in study
d_O	Number of obverse dies identified in study
d_R	Number of reverse dies identified in study
N	Number of coins originally produced
n	Number of coins included in study

Unless stated all dates are B.C..
Images of coins are not actual size. Those identified as CNG are courtesy of Classical Numismatic Group (cngcoins.com).

Introduction

The Graeco-Bactrian kingdom of the mid third to the mid second century BC consisted of the region between the Hindu Kush mountain range in the south and the Oxus (Amu Darya) river to the north, what today is mainly part of northern Afghanistan and sections of Tajikistan and Uzbekistan. The geographical position of the kingdom is of particular importance to its history, with cultural influences coming from both east and west; it is a land in which 'routes converge from all quarters of the compass and from which routes radiate out to all quarters of the compass again'.[1] The kingdom was part of a wider Greek presence in the regions of Bactria, Sogdiana, Arachosia, and later, Gandhara, which has come to be referred to as the Hellenistic Far East.[2]

By the time of the Graeco-Bactrian kingdom, Greek settlement in the area had long been established. Even before Alexander the Great had conquered the region between 329 and 327 and left a garrison of Greek soldiers, the Persians had removed troublesome Greeks to this remote corner of their empire and by the time Alexander encountered these exiles they spoke the local language in addition to Greek. [3] The Persians had also fostered commercial contacts with the Mediterranean throughout Bactria's period as a satrapy, a connection demonstrated by finds of fifth century Greek coins in the region.[4]

After Alexander's death in 323, the region eventually became part of the Seleucid empire, although not until an agreement with the Mauryan king Chandragupta in 305 was the possession secure.[5] At some point in the middle of the third century the Graeco-Bactrian kingdom was created when Diodotus, perhaps the former Seleucid governor, set himself up as king.[6] His successors ruled the area north of the Hindu Kush for perhaps a century or so, before an invasion of nomads put an end to the kingdom. Kings with Greek names and using Greek legends on their

[1] Toynbee (1961), 2.
[2] Mairs (2011), 9.
[3] Herodotus, *Histories*, 6.9; Diodorus Siculus, 17.110.4-5.
[4] Holt (1989), 28.
[5] Kosmin (2014), 32-34.
[6] Lerner (1999), 13-31.

coins continued to rule further south in Gandhara and India into the first century AD.

Much of the evidence for the Graeco-Bactrian and Indo-Greek kingdoms is extremely limited. A number of references to the kingdoms appear in various ancient histories, but often only as footnotes to other events.[7] Unlike other Hellenistic kingdoms, epigraphic and documentary sources are virtually non-existent. The archaeological evidence is, however, more substantial.

Archaeology

A number of sites have been excavated, the most famous being the so-called 'Greek city in Central Asia', at Aï Khanum in north east Afghanistan.[8] Discovered in 1961, it was excavated by the *Délégation Archéologique Française en Afghanistan* (DAFA) between 1964 and 1978.[9] The reports of the excavations have been published gradually, although the process is still far from complete.[10] A number of coin hoards are also known to (or are said to) have come from the city, and these are discussed below. Much of the scholarship of the city has focused on its Greek and non-Greek features. The internal street plan, for example could be that of any Greek city albeit, with the apparent lack of an *agora*. On the other side of the argument, the famous 'Temple with Indented Niches' is often held up as an example of the city's 'Mesopotamian elements'.[11] Recently scholarship has begun to move away from such binary distinctions into the study of 'hybridity' and cultural identity.[12]

The dating of the city is contentious. A foundation in the late fourth or early third century seems likely, and a recent study of the ceramic evidence has suggested that the Temple with Indented Niches was built during the reign of Antiochus I.[13] The

[7] Holt (1999), Appendix D, 174-184 collects the main texts. The fact that this takes only ten pages is illustrative of just how sparse the sources are.
[8] Bernard (1982). The city's ancient name is not known.
[9] Bernard (2001). An account of the more recent desperate state of the site is also included, a situation that seems to have only become worse in recent years.
[10] For the purposes of the following study, the fourth volume of *Fouilles d'Aï Khanoum* (Bernard (1985)) is the most relevant in publishing the non-hoard coins from the site.
[11] Downey (1988); Mairs (2013).
[12] Mairs (2014), 57-101.
[13] Lyonnet (2012), 158.

pottery indicates that this initial phase of occupation was a military one.[14] Later, perhaps towards the end of the third century BC, the number of inhabitants increased and it was during this period that the ceramic evidence from the site changed with the appearance of more influences from the Mediterranean world.[15] The use of Athenian Megarian bowls, for example, at the beginning of the second century has been suggested as evidence of the influx of a new wave of settlers from the west, perhaps to be associated with Antiochus III's military expedition to Bactria.[16] The excavators date much of the final stage of the city's development, in which several large public buildings were constructed or rebuilt, to the period of Eucratides I.[17] After a destruction layer, the date of which is debated, the city seems to have been finally abandoned by 130.[18]

Although Aï Khanum is not the only archaeological site in Bactria it is the only one to have thoroughly excavated Hellenistic layers. The ancient capital, Bactra (Zariaspa), modern Balkh is mentioned by Polybius (11.34) as we shall see, but multiple excavations there have failed to find significant evidence of the Hellenistic city.[19] Likewise, the settlement at Termez in north western Bactria, now Uzbekistan, has been excavated, but much of the Hellenistic layer is buried below those of the Kushan period.[20] A similar situation is also found south of the Hindu Kush at Begram, near modern Kandahar.[21] Further south still, Gandhara, the region between the Kabul and Indus rivers in modern Pakistan, had been part of the Achaemenid empire before being absorbed into the Mauryan empire and it is thought to have been invaded by the Bactrian Greeks in the early second century. Again, however, much of the archaeological evidence in the region dates from later periods.[22] One exception is the site of Taxila which was excavated in the first half of the twentieth century by Marshall.[23] Many of the discoveries of the excavation, however, relate to the Buddhist and Kushan periods.

[14] *Ibid*.
[15] Lyonnet (2012), 155.
[16] Martinez-Sève (2014), 271.
[17] Martinez-Sève (2014), 271-272.
[18] Lerner (2010).
[19] See Mairs (2011), 29-30 for a full summary of the work at Bactra.
[20] Leriche and Pidaev (2008).
[21] Mairs (2011), 35.
[22] Mairs (2011), 35-37.
[23] Marshall (1951).

Coins and history

Although both the archaeology and, as we shall see, the written sources are extremely limited in their scope, the numismatic evidence for the Graeco-Bactrian kings is extensive. While eight kings are known from literary sources, we have coins of at least forty different rulers.[24] Indeed, much scholarship from before the discovery of Aï Khanum was based almost entirely on coins, often attempting to reconstruct a political history from the evidence they provide. The story of the initial discovery of Bactrian coins as well as the development of the study of the field has recently been told by Frank Holt.[25] From this beginning the British colonial presence in the region led to the publication of many more coins, as well as the interpretation of the hitherto unknown scripts that appeared on some of them.[26] A major figure in this process was Alexander Cunningham, whose large collection of coins is now in the British Museum. Cunningham's interpretation of the coins he published was often based on their find spots as well as his extensive knowledge of the local archaeology. His discussion of the monograms that appear on the vast majority of Graeco-Bactrian and Indo-Greek coins is an interesting example.[27] Unfortunately much of this knowledge was not explicitly described in Cunningham's work, leaving modern scholars to guess at the basis of his inferences.

Following the publication of increasing numbers of coins, which gradually expanded the list of kings, attempts were made at constructing over-arching narrative histories of the Greek presence in the region. One of the first was MacDonald's chapter in the *Cambridge History of India*.[28] The most famous example of such an approach, however, is that found in Tarn's *The Greeks in Bactria and India*, which laid the basis for much of what followed.[29] Tarn's main source for his history was the *British Museum Catalogue* of the relevant coins. His scholarship was very much coloured by the colonial context in which it was written and he chose to emphasise the Hellenistic side of his narrative, a position he makes clear in the

[24] Bopearachchi (2008), 245.
[25] Holt (2012), 7-88.
[26] See, for example, Prinsep (1844).
[27] Cunningham (1884), 60-77.
[28] MacDonald (1922).
[29] Tarn (1951). Initially published in 1938, the revised edition is used here.

introduction to his book, '…in the history of India the episode of Greek rule has no meaning; it is really part of the history of Hellenism, and that is where its meaning resides.'[30]

Although often persuasively argued, the problems with Tarn's narrative are clear to the modern reader. Writing political history from numismatic evidence alone is challenging to say the least and often leads to results that are pure fantasy. The task has recently been put into modern terms, 'Imagine a forty- or fifty-page history of Franklin D. Roosevelt's presidency based solely on the iconography of the US dime, or a biography of Queen Elizabeth II based on the £5 and £10 note.'[31] Most importantly, imagine the potential for a single misinterpretation of the iconography. For example, the new portrait of the Queen by Jody Clark introduced in 2015 shows the monarch wearing an earring, a detail absent from the previous portrait, but present on earlier examples. What should, or could, the biographer make of such an addition?

In Tarn's story every available piece of evidence was made to work as hard as possible. The deity that appears on the reverse type of the coins of certain kings, for example, became a dynastic badge linking those kings together.[32] The choice of deity was even used in some cases to suggest a particular event. For example, Poseidon appears on the coins of the Graeco-Bactrian king Antimachus I, a fact that Tarn takes to be indicative of a naval victory.[33] The obverse portraits of certain kings were also analysed in great detail in an attempt to infer the 'character' of the king. In one of Tarn's most extraordinary passages he links Antimachus' appearance in which he finds 'no trace of overweening pride…he is rather amused at himself', with that king's use of the epithet *theos* on his coins to suggest that he was in fact fond of irony. In reference to the title he adopted, Tarn even imagines the king's thought process in choosing an epithet that suggested his own divinity, 'this is what the great kings think, so let a small king say it.'[34] It is no wonder then

[30] Tarn (1951), xx.
[31] Thonemann (forthcoming).
[32] For example, the kings of the 'Euthydemid dynasty' are to be identified by their use of Heracles on the reverse of their coins.
[33] Tarn (1951), 90.
[34] Tarn (1951), 92.

that so much of Tarn's 'history' does not hold up under close examination and for this reason it has often been referred to only briefly in the study.

Many of Tarn's more fantastic suggestions were dismissed by A.K. Narain in *The Indo Greeks*.[35] Like that of Tarn, Narain's approach can be summed up by a single sentence from the beginning of his book, '[The Indo-Greeks'] history is part of the history of India and not of the Hellenistic states; they came, they saw, but India conquered.'[36] As Rachel Mairs has pointed out, the context of Narain's work, only a decade after Indian independence, heavily influenced the outcome.[37] Although Narain often argued against Tarn's interpretation, much of his own narrative was methodologically similar in approach. His consideration of Antimachus' Poseidon coin type is a good example. Narain dismissed Tarn's association with a naval victory, quite correctly seeing no basis for such a connection. He preferred instead to highlight the god's role as 'creator and protector of horses', and suggested that the type may have appeared on Antimachus' coinage because his kingdom contained a region well known for producing that particular animal.[38] Even in the last twenty years, with the problems of narrative political approaches to the history of the period clear, attempts have still been made to produce such synthetic histories of the Graeco-Bactrian and Indo-Greek kingdoms.[39] Even otherwise sound numismatic scholarship has been influenced by attempts at analysing the portraiture of the kings. [40]

Many of the difficulties with such approaches were exacerbated by the lack of a full catalogue of the relevant coins. For Tarn and Narain, the main source was Gardner's *British Museum Catalogue*, published in 1886. Smith and Whitehead produced catalogues of the coins in the collections of the Indian Museum in Calcutta and the Punjab Museum in Lahore respectively, both of which suffered from a limited selection of available types and only a small number of illustrations.[41] The first attempt at a complete catalogue was A. N. Lahiri's *Corpus of*

[35] Narain (1957).
[36] Narain (1957), 11.
[37] Mairs (2006), 22.
[38] Narain (1957), 49. For a full analysis of the arguments used by Tarn and Narain see Guillaume (1990).
[39] Widemann (2009).
[40] Jakobsson (2010), Appendix I, 'Age and realism on Graeco-Bactrian and Indo-Greek coins', 43-49.
[41] Smith (1906); Whitehead (1914).

Indo-Greek Coins, which is notable for dealing with the difficulties of chronology by arranging the kings in alphabetical order.[42] The first well-illustrated catalogue came with Michael Mitchiner's nine volume *Indo-Greek and Indo-Scythian Coinage*.[43] Mitchiner, however, took a similar approach in his commentary to that of Tarn, with the control marks that appear on the coins taken as reliable indicators of different mints leading to many over-confident attributions and another over-arching narrative.

The now standard catalogue was published in 1991 by Osmund Bopearachchi. Although based on the collection of the *Bibliothèque nationale* every known type and denomination was included. At least one coin of every series was illustrated and the publication of the catalogue was the catalyst for much renewed interested in the coinages. Indeed the later 1990s saw the first major attempts to apply sound numismatic methodology to the Bactrian coins. Kovalenko produced a die study of the coins of the first Graeco-Bactrian kings, the Diodotoi, while Frank Holt published a book on the same coins.[44] Both sought to organise the numismatic material and then use the evidence from their reconstructions of the systems of production to inform any attempt at writing history. At the same time the number of Graeco-Bactrian coins appearing on the coin market increased substantially with the discovery of a number of hoards in the region, including the enormous deposit at Mir Zakah (see Find Evidence chapter). Many of these coins included new varieties of portraiture and previously unknown control marks, greatly increasing the potential for study. With the coins of the Diodotoi thoroughly studied, this work focuses on the coins of the following six kings: Euthydemus I, Demetrius I, Euthydemus II, Pantaleon, Agathocles, and Antimachus I.

Written Sources

Before turning to the coins issued by those kings, we must first review the other sources of evidence for their reigns. Of the six kings who are the subject of the current study, two (Euthydemus I and Demetrius I) are mentioned in literary texts and on a single inscription, while the name of Antimachus appears on two leather

[42] Lahiri (1965).
[43] Mitchiner (1975).
[44] Kovalenko (1996); Holt (1999).

documents from Bactria. The remaining kings (Euthydemus II, Pantaleon, and Agathocles) are known only from their coins. None are clearly present in the archaeological record. It is immediately clear from what follows just how difficult interpretation of the period will be. With such little information we cannot even be certain in what order the final four kings ruled. On the basis of the numismatic evidence, the order given here appears to be correct. Below, at the beginning of each numismatic chapter the reasons for this order will be discussed. Throughout the study absolute dates for the reigns of the kings have been deliberately omitted, since they require many unfounded assumptions and give a false sense of confidence in the chronology.

Euthydemus I and Demetrius I

The independence of the Graeco-Bactrian kingdom from the Seleucids is mentioned briefly by Justin (41.4.5-10). 'Theodotus', presumably a different spelling of Diodotus, is described as 'the governor (*praefectus*) of the thousand cities of Bactria', who 'rebelled and ordered that he be called king'.[45] After the rise of Arsaces in Parthia, Justin tells us that Theodotus died and was succeeded by a son of the same name who concluded a peace treaty with the Parthians.

Justin's epitome does not discuss Euthydemus, who is, however, mentioned in some detail by Polybius with reference to Antiochus III's *anabasis* to reconquer the Upper Satrapies. In 220 the Seleucid king had defeated a rebellion in Media led by the former satrap Molon. Between 212 and 205 he undertook a second expedition to the east. Antiochus forced Xerxes of Armenia to submit, before invading Parthia and, having occupied the capital, Hecatompylos, agreed to the peace asked for by Arsaces II. In 209 Antiochus advanced into Bactria where, Polybius tells us (X. 49), he was met by Euthydemus with an army, as well as a cavalry force ten thousand strong. While attempting to surprise the forces of Euthydemus, Antiochus' army was attacked by the Bactrian cavalry and, after heavy losses on both sides, with Antiochus distinguishing himself in the fighting, the Seleucids were able to drive

[45] *defecit regemque se appellari iussit.*

off their attackers. The result, as Polybius says, was that 'Euthydemus was struck with terror and pulled back with his army to Zariaspa (Bactra)'.[46]

It was this defeat that led to Antiochus' two-year siege of Bactra ending *c.*206, the only secure date related to the six kings in the current study. Unfortunately, we do not have any discussion of this action, although Polybius does mention Bactra elsewhere in a list of famous sieges.[47] He does, however, discuss its end in some detail (XI.34), the source for which may have been a Seleucid court historian.[48] Antiochus, unable to bring the siege to an end and capture Bactra, sent a certain Teleas to negotiate with the Bactrians. Teleas originally came from Magnesia in Asia Minor, an origin, Polybius tells us, he shared with Euthydemus.[49] Euthydemus argued that Antiochus was not justified in taking back the kingdom, as it was not Euthydemus who had rebelled against the Seleucids, rather it had been others who had initially set themselves up as independent and he had taken the throne by destroying their descendants. Whatever the merits of Euthydemus' argument, it is the only source that refers to his coming to power and as such is the basis of the different dynasties reconstructed and set up against each other by Tarn and others, the 'Diodotids' and the 'Euthydemids'.

Polybius has Euthydemus continue with a different argument. He referred to the approach of large numbers of nomads who would be a danger to both himself and Antiochus, and who would, were they allowed to enter, completely barbarise the land. As Paul Kosmin has recently noted this line of reasoning was much more powerful: 'Euthydemus was a participant in the defense of civilization; he and Antiochus were two kings in alliance against barbarism'.[50] Teleas returned to Antiochus with these remarks and Polybius tells us the Seleucid king consented to the treaty because of them.

[46] Polybius X.49.15.
[47] Polybius XXIX.12.8.
[48] Primo (2009), 133-135.
[49] Which Magnesia is not stated. For further discussion of this matter see Iconography chapter.
[50] Kosmin (2014), 67. Tarn (1951), 82 instead implies that this was blackmail on the part of Euthydemus, but such a move could easily have backfired on him.

In order to ratify the agreement Euthydemus sent his son, Demetrius, to Antiochus. Polybius refers to Demetrius as a young man (νεανίσκος), a word which Tarn understood as indicating Demetrius' age as between 19 and 20 in 206.[51]

> ὁ βασιλεὺς ἀποδεξάμενος, καὶ νομίσας ἄξιον εἶναι τὸν νεανίσκον βασιλείας καὶ κατὰ τὴν ἐπιφάνειαν καὶ κατὰ τὴν ἔντευξιν <καὶ> προστασίαν, πρῶτον μὲν ἐπηγγείλατο δώσειν αὐτῷ μίαν τῶν ἑαυτοῦ θυγατέρων δεύτερον δὲ συνεχώρησε τῷ πατρὶ τὸ τῆς βασιλείας ὄνομα.
>
> The king [Antiochus], on receiving the young man and judging him from his appearance, conversation, and dignity of bearing to be worthy of royal rank, in the first place promised to give him one of his daughters in marriage and next gave permission to his father to style himself king.
>
> Polybius XI.39.6 (tr. W.R. Paton)

The reference to a marriage between Demetrius and a Seleucid princess is particularly interesting, but we do not know whether the union ever took place. Euthydemus did, however, remain king of Bactria, although he was forced to hand over his force of elephants to Antiochus who added to them when he continued his journey into India to renew the alliance with the Mauryan ruler Sophagasenus.

There is also a brief mention of the two kings in Strabo in a discussion of Bactria:

> τοσοῦτον δὲ ἴσχυσαν οἱ ἀποστήσαντες Ἕλληνες αὐτὴν διὰ τὴν ἀρετὴν τῆς χώρας, ὥστε τῆς τε Ἀριανῆς ἐπεκράτουν καὶ τῶν Ἰνδῶν, ὥς φησιν Ἀπολλόδωρος ὁ Ἀρτεμιτηνός, καὶ μάλιστα Μένανδρος … τὰ μὲν γὰρ αὐτός, τὰ δὲ Δημήτριος ὁ Εὐθυδήμου υἱός, τοῦ Βακτρίων βασιλέως.

[51] Tarn (1951), 73. See also Hollis (2011), 111.

> The Greeks who caused Bactria to revolt grew so powerful on account of the fertility of the country that they became masters, not only of Ariana, but also of India, as Apollodorus of Artemita says: and more tribes were subdued by them than by Alexander – by Menander in particular ... for some were subdued by him personally and others by Demetrius, the son of Euthydemus the king of the Bactrians.
>
> Strabo *Geography*, II.II.I (tr. H.L. Jones)

Once more the relationship between Euthydemus and Demetrius is mentioned. The notion of Demetrius as a successful conqueror also stems from this passage, and has been put to extensive use in historical reconstructions. It is interesting to note, although Strabo is not completely clear in his structure, that some of Demetrius' conquests are said to have taken place in India. This is the full extent of the literary sources.

There is also a single inscription which refers to Euthydemus I and Demetrius. Now held in a private collection, the stone was apparently found near Kuliab, approximately 50 km from Aï Khanum, in modern Tajikistan.[52] The context of the discovery is unknown and the attribution to Kuliab is perhaps not to be trusted.[53]

[52] Bernard, Pinault, and Rougemont (2004).
[53] Mairs (forthcoming).

Τόνδε coι βωμὸν θυώδη, πρέcβα κυδίcτη θεῶν
Ἑcτία, Διὸc κ(α)τ᾽ ἄλcοc καλλίδενδρον ἔκτιcεν
καὶ κλυταῖc ἤcκηcε λοιβαῖc ἐμπύροιc Ἡλιόδοτοc,
ὄφρα τὸμ πάντων μέγιcτον Εὐθύδημον βαcιλέων
τοῦ τε παῖδα καλλίνικον ἐκπρεπῆ Δημήτριον
πρευμενὴc cώιζηιc ἀκηδεῖ(c) cὺν τύχαι θεόφρον[ι].

This fragrant altar to you, Hestia, most honoured among the gods, Heliodotus established in the grove of Zeus with its fair trees, furnishing it with libations and burnt-offerings, so that you may graciously preserve free from care, together with divine good fortune, Euthydemus, greatest of all kings, and his outstanding son Demetrius, renowned for fine victories.[54]

Euthydemus and Demetrius are referred to together, and again the familial relationship is confirmed. Although only Euthydemus is given the royal title, it was not unusual for Hellenistic monarchs to appoint their eldest son as co-regent, with Seleucus I's elevation of Antiochus I being one of the first examples, a procedure presumably intended to help consolidate the dynasty, a significant concern for Euthydemus.[55] The adjective used to describe Demetrius here is καλλίνικος ('renowned for fine victories'). The same word was apparently used as an epithet by Seleucus II.[56] Demetrius' coin portrait in which he wears an elephant scalp helmet, as well as Strabo's reference, have led historians to assume that these victories took place in India. Of course, such analysis presupposes that the epithet should be understood as referring to a specific event. By giving Demetrius his own command, Euthydemus was again preparing him for kingship, and hoping to secure his succession. The possibility of a co-regency is an interesting one. Although only Euthydemus is given the royal title in the inscription, it was clearly considered necessary to include Demetrius in the dedication. This may pose some difficulties for attempts at historical reconstruction. Would Demetrius' and Euthydemus' coinages have overlapped during this potential co-regency period? As we shall see again later, the written evidence poses more questions than it answers.

[54] Text: Bernard, Pinault, and Rougemont (2004); translation: Hollis (2011), 110.
[55] Walbank (1984), 66-67. Interestingly, however, Seleucus and Antiochus both seem to have been referred to as kings (*OGIS* 214).
[56] Polybius II. 71.4.

Euthydemus II, Pantaleon, and Agathocles

We would not know of the existence of Euthydemus II, Pantaleon, and Agathocles were it not for their coins. The lack of other categories of evidence obviously places extra pressure on the writers of political history to make the coins work as hard as possible. As we shall see, these three kings issued similar coins, including a large series made from a novel cupro-nickel alloy, which was not used under any other kings either before or after. The types that appear on their coins are also similar and they seem therefore to have ruled consecutively.

Antimachus I

As with the three preceding kings, no reference to an Antimachus is found in the literary sources and historians have relied very heavily on the numismatic material to glean any information about his reign, as we saw earlier with the efforts of Tarn and Narain. Since those works other sources of information have appeared. In the early 1990s a small piece of leather with a number of lines of Greek text came to the attention of R.C. Senior and was acquired by him and ultimately donated to the Ashmolean Museum. Although its provenance was unknown, it was assumed to have come from the region of Bactria. Unfortunately, only a proportion of the original text remains legible. I have been able to inspect the object in person and after viewing under ultra violet light, certain small areas of the text become clearer (**fig. 2**). It seems unlikely, however, that a more complete reconstruction of the text than that included in its 1994 publication will be produced.[57] In fact some of the apparently certain readings included in the original publication are now much less visible. It is hoped that new techniques can be applied to the document in the future to recover text from the damaged areas.

[57] Rea *et al.* (1994), 263.

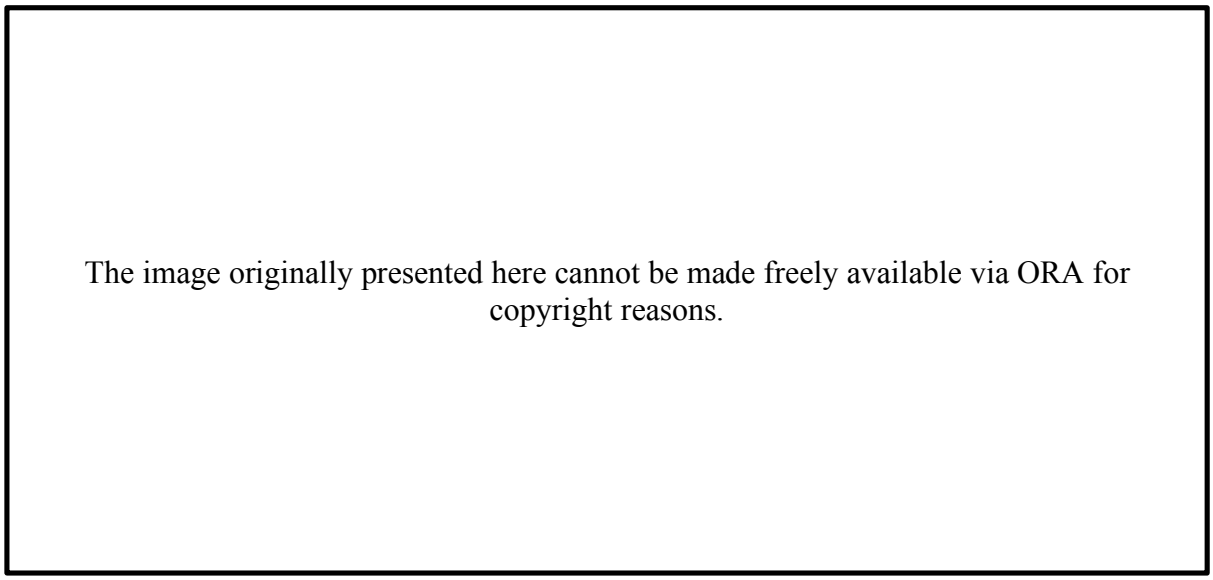


Figure 2: Hellenistic 'tax receipt' mentioning Antimachus (Ashmolean EA 1994.79)

The item seems to be some sort of tax receipt. Our main interest in the document is the dating clause that appears at the start, in the first two lines. The following is taken from Rea's cautious reconstruction:

> βαcιλευόντων θεοῦ Ἀντιμάχου καὶ Εὐμένους καὶ Ἀντιμάχο[υ
> .....ου, ἔτους δ, μηνὸc Ὁλώιου, ἐν Ἀcαγγώρνοις...
>
> In the reign of God Antimachus and Eumenes and Antimachus ... year 4, month of Olöus, in Asangorra (?)

Unfortunately, the reconstruction of the place name 'Asangorra' is uncertain, and no such name or a possible variant is recorded from the region. Likewise the dating of 'year 4' is also unclear. The appearance of three rulers, 'God Antimachus', 'Eumenes', and 'Antimachus' ... is very interesting. It is presumably safe to assume that 'God Antimachus' equates to the Antimachus who appears on coins with the epithet *theos*. The other two names are much less certain. No Bactrian king Eumenes is to be found in the numismatic record, or elsewhere, while the destruction of the word (or words) following the second Antimachus is particularly unhelpful. The hypothesis to explain such a group of kings at the beginning of the document put forward in the original publication by Hollis that Eumenes and the second Antimachus were the sons of God Antimachus seems reasonable, similar to the

appearance of Demetrius with Euthydemus in the Kuliab inscription, although whether the second Antimachus is the Antimachus Nikephoros known from coins is still uncertain.[58] Although interesting in its own right the information from this document does little to secure any potential historical reconstruction.

A second document, also mentioning a king Antimachus, was published in 2007 by Clarysse and Thompson. This document is part of a private collection and I have been unable to examine it in person. What follows is the reading and translation given in the original publication.

> Βασιλεύοντος Ἀντιμάχου ἔτους τριακοστοῦ [μηνὸς - -]
> ἐν Ἀμφιπόλει τῆι πρὸς τῆι K αρελοτηι εἰσηγεῖτα[ι - - τῶν]
> ξένων μαν ηερχολλ μηνον . . . . τῶν τεσσαρά[κοντα - - -]
> Σκυθῶν ἀργυρίου ἐπισήμου δραχμῶν ἑκατὸν [- - -]
> [. . . . τοῦ. .] .ε . . μενου πλήθους τοῦ ἀργυρίου [- - -]
> [.]αρε . [ ]
>
> In the reign of Antimachus in year 30 [month + day]
> in Amphipolis near K.arelote has introduced [NN of the]
> mercenaries (?) [to] NN of the for[ty - - -]
> Scythians, of one hundred drachmas of coined silver [- - -],
> [ ] of [the above mentioned (?)] sum of money[[59]

The document is again written on a piece of skin and is barely legible in many places. In fact, the above transcription has significantly more conjectures than the earlier tax receipt. This document seems to be a contract of some kind and is interesting for a number of reasons: the mention of an Amphipolis (again otherwise unattested, but presumably in Bactria), the mention of Scythians, and the reference to coined silver. It is, however, once again the dating clause at the start of the contract that is of most interest here. An Antimachus is said to be ruling, although this time without the names of other kings mentioned. Clarysse and Thompson, on

[58] Rea *et al.* (1994), 268-278.
[59] Clarysse and Thompson (2007), 276. In the image supplied with the publication of the document the name in the first line is less than clear. In fact, the authors themselves 'are still not entirely happy with the name Antimachos', although from their tracing of the text it seems the only serious option.

the basis of the letter forms in the text that indicate a date in the early second century BC, suggest that the Antimachus mentioned here is Antimachus I, and not the later Nikephoros.[60] The lack of the king's usual epithet (θέος) is striking and it was suggested that the epithet is missing because it had not yet been adopted by the king.[61] Since *theos* is present on all the king's coins, such a suggestion is surely incorrect. It seems more likely that, unlike the tax receipt which clearly had an official purpose and background to its production, this contract was a more personal document not produced by someone who represented the state, as the receipt presumably was. This difference in purpose and register would account for the other variation in the dating clause, the omission of the names of Eumenes and the second Antimachus. For those participants in the transaction, the longer-winded dating clause was not important, what mattered was the rest of the text.

The mention of a 'year 30' in the first line of the document is of particular interest for Antimachus. Clarysse and Thompson suggest that it is unlikely that the year refers to Antimachus' reign since his 'coinage is not extensive and portrays an elderly king', and is more likely to indicate a date within an era.[62] As we shall see later, the coins minted under Antimachus are quite numerous, and the original output was significantly higher than his immediate predecessors. The interpretation of the king's age from his depiction on coins is even more problematic. Although Antimachus does appear to be an adult (as opposed to the distinctly boyish Euthydemus II), there are no consistent features of his appearance that especially identify him as elderly. The identification of 'year 30' as being part of an era dating system is even more problematic. The Indo-Greek era apparently starting in 186/5 BC is assumed by Clarysse and Thompson to be too late for the document in question, and so they propose a 'Euthydemid era', a suggestion apparently backed up by the commemoration of Euthydemus on Antimachus' 'pedigree' tetradrachms.[63] Diodotus Soter, presumably the first Diodotus, also appears on the 'pedigree' coins, making any era just as likely to have started with him. Whatever the case, the lack of secure dating dooms any attempt to identify eras to failure and debate of these systems is avoided here.

[60] Clarysse and Thompson (2007), 275.
[61] An argument accepted by Rougemont (2012), 193.
[62] Clarysse and Thompson (2007), 275.
[63] For the dating of the Indo-Greek era see Salomon (2005), 364- 371.

The extremely limited nature of the non-numismatic evidence is patently clear. We know that Euthydemus and Demetrius were father and son, faced a Seleucid invasion led by Antiochus III, and that Demetrius may have had some military success south of the Hindu Kush. We know nothing of the intervening kings except for their coins, while the evidence for Antimachus is puzzling. We find some sort of joint kingship, involving an otherwise unattested Eumenes, and a second Antimachus whom we know from coins. One document refers to the payment of mercenaries, perhaps by a private individual, something that may reflect a deteriorating security situation in the kingdom. After this review, and the extremely limited evidence gleaned from it we must now turn to the best primary source for the Graeco-Bactrian kingdom, the coins and a fresh approach to the evidence they provide.

Chapter I: Methodology

Having surveyed the available evidence from literary, archaeological, and epigraphic sources for the six Graeco-Bactrian kings who will be the focus of this study, it is clear that the coins that were minted under their authority are by far the best source of evidence for the history of their kingdom. As Frank Holt has recently observed, 'for nearly three hundred years, Bactrian numismatics has concentrated on the names, number, and order of kings; their kinship and marriage ties with each other; their personalities and appearance; their rivalries and their conquests.'[64] Holt continued by suggesting a new approach to the study of these coins, tentatively labelled 'cognitive numismatics' in which a 'bottom-up' approach is taken to 'ask how material objects may illuminate the mental processes that shaped them'.[65]

I intend to follow this approach, but applying a recognised numismatic methodology: the die study. In the ancient world coins were usually produced by placing a prepared piece of metal of the appropriate weight between two engraved dies and striking the uppermost die (the reverse) with a hammer to imprint the type onto the coin (**fig. 3**). The dies were probably pieces of bronze that had been engraved with the required type for the coin. Since the dies were cut by hand no two are exactly the same and it is therefore possible, by looking closely at the coins, to say which coins were struck by the same die. This feature is referred to throughout as a shared die identity.[66]

[64] Holt (2012), 162.
[65] Holt (2012), 163.
[66] Unfortunately, a shared and consistent terminology for die studies does not exist. In this study terms from recent die studies have been adopted and in some cases adapted. The majority of terms follows those used by Bracey (2009), in particular 'meta', 'inter', and 'intra' die analysis.

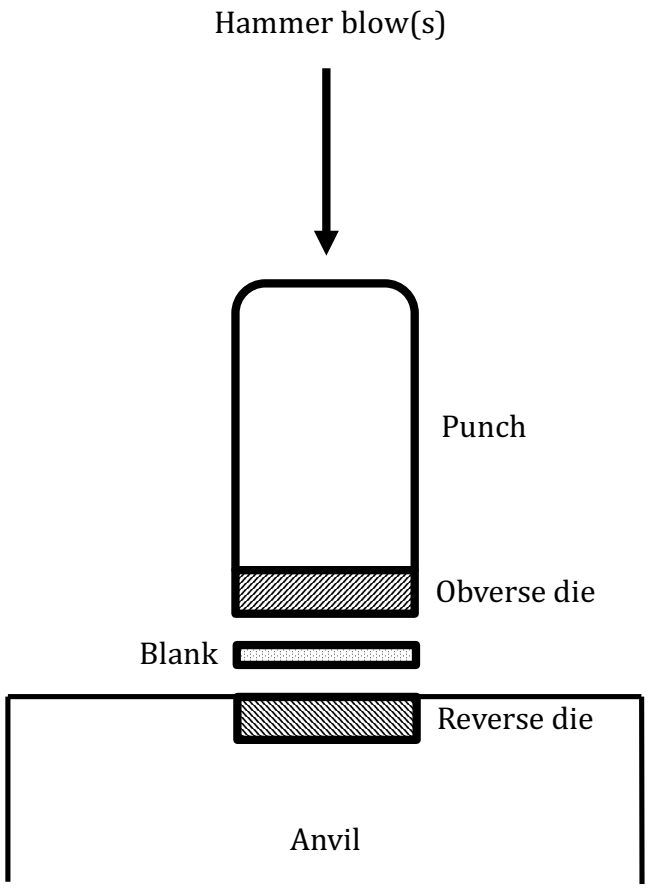
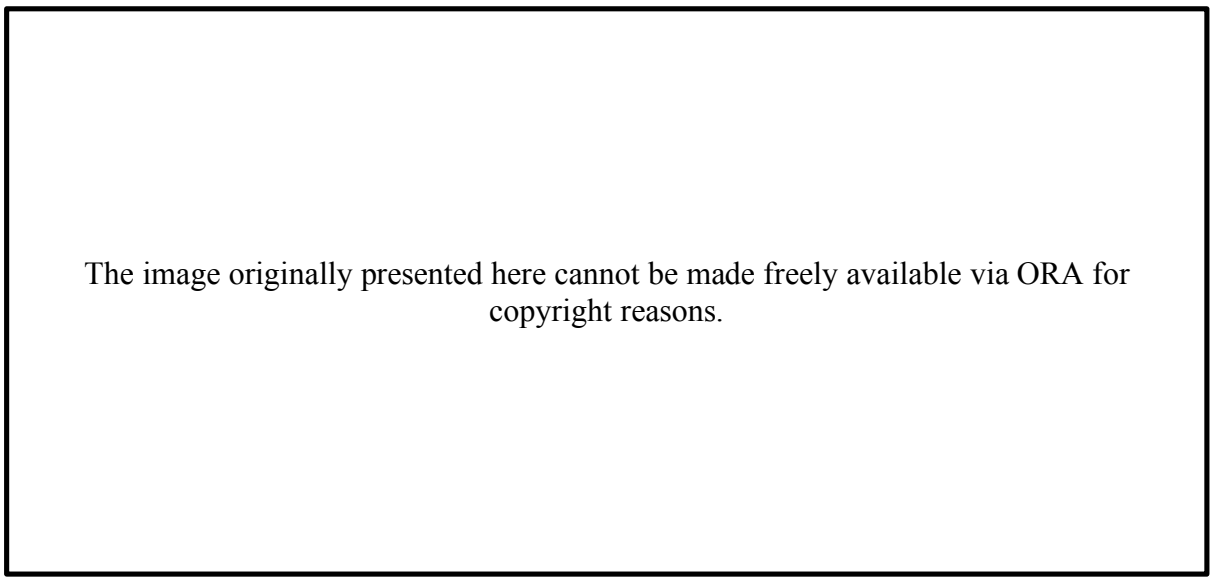


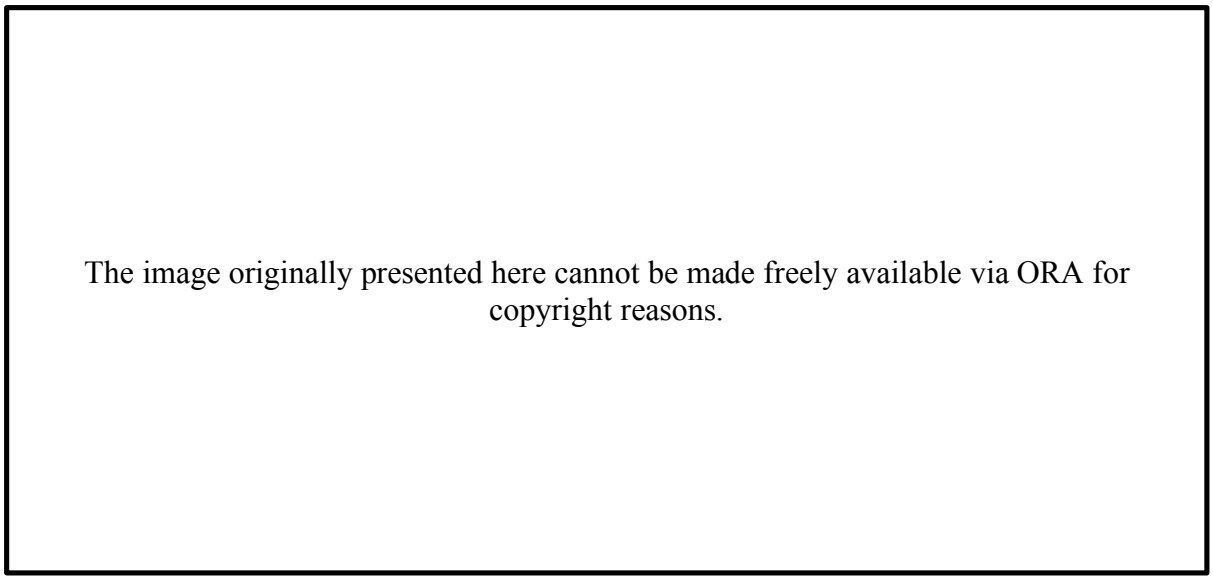
Figure 3: Striking coins

The process of identifying die links is rarely discussed in studies of this nature. The illustration (**fig. 4**) below shows two different tetradrachms of Antimachus I, both of which appeared in auctions. Three particular features of the type and legend have been circled on both the obverse and reverse of each coin. On the obverses, which already share a distinct portrait style, the two stray locks on the king's temple, the peculiar design of the garment at his shoulder, and the distinctive shape of the neckline all indicate that the coins were struck by the same obverse die. The reverses, however, are the product of two different dies. The process of checking die identity on this side of the coins is made easier by the inclusion of the legend. It is often simple to trace an imaginary line from the end of a particular feature of the type (in this case the streamers running from Poseidon's palm leaf) and see to which letter it is roughly aligned. On the first coin, these two lines approximately run to the lambda, while in the second coin below the lines terminate much further away from the legend, with one in line with the epsilon. It is immediately clear from this difference that there is no reverse die link between these two coins. There are, however, two other features circled on both coins. The

upsilons as the last letters of both lines of the legend are each aligned differently with the exergue line on both coins.



Ira & Larry Goldberg 63, 31st May 2011, 2511



CNG MBS 69, 8th June 2005, 802;
Cayón Subastas, 6th October 2005, 151

Figure 4: Establishing shared die identity.

This process is, of course, far from completely objective and requires a number of judgements to be made when confirming links. It is often difficult to see whether a particular feature is present on the coin after years of circulation, or because it was on the die. The same coin can appear for sale a number of times (see lower coin in **fig. 4**), leading to duplicated die links. This problem is often exacerbated by the

different weights given in commercial publications. The weights given for the coins, as well as a comparison of the outlines of the edges of the two coins can help to confirm that they are in fact the same coin. Poor quality photographs also make the process more difficult, as do different lighting conditions, which can affect the shadows cast by areas of higher relief on the coins. For these reasons I have tended to be cautious when identifying die links, and when particularly important links have been discovered (particularly in the tetradrachm coinages of Euthydemus as well as the 'pedigree' issues of Agathocles and Antimachus) the die-linked coins have been illustrated together in the text to allow the reader to make his or her own judgement.

Previous studies

The first to notice the great potential for historical interpretations of studying the different dies with which the coins were struck was E.H. Bunbury who, in 1869, argued against a recently published attribution of two coins of Lysimachus to different mints on the basis of an obverse die link.[67] It took some time, however, for the large-scale application of this method to a single mint, the first monograph of this type appearing in 1906 and organising the coinage of Terina.[68] Since then the methodology has been applied to many coinages, with the gaps in our understanding gradually being filled in. It has been suggested, none too seriously, that the date by which we will have die studies for all the coinages of the Hellenistic world will be 2093.[69] Although the completion of such studies is eagerly awaited, one area in which we have very little information is the Graeco-Bactrian kingdom, despite the clear importance of the numismatic material. There exists one die study, that of the coins of the first kings of the independent kingdom, Diodotus I and II.[70] Kovalenko's article was the first to study the coins in a systematic fashion from as large a corpus as possible and was therefore able to draw soundly-based conclusions about the organisation of the production of the coinages of the Diodotoi, which lead to more general historical conclusions concerning the date of the independence of the kingdom. Frank Holt later published a book on the same period and kings, including his own arrangement of the coins. Although the book

[67] Bunbury (1869), 7.
[68] Regling (1906).
[69] Callataÿ (1997), 324-325.
[70] Kovalenko (1996).

contains a catalogue of the available issues, a full die analysis is absent.[71] A similar, yet far more thorough approach was taken to the same material (albeit with the addition of the coinage of Euthydemus I) by Brian Kritt.[72] Once again although the coins were studied in great detail, with a thorough taxonomic arrangement, no die study was included. The relative abundance of studies of the coins of the Diodotoi is perhaps not surprising given they were the first kings of an independent Bactria, and these studies will provide some data for comparison. I therefore begin my own study immediately after these kings with Euthydemus I and ending with Antimachus I.[73] No work of such a detailed nature has been undertaken to my knowledge on these kings. Although some specific areas of their coinages have been discussed in numismatic literature no full die study exists.

Gathering the corpus

For a die study to be successful it is essential to gather as large a corpus of the coins together as possible. Many Graeco-Bactrian coins are held in large, national collections, accessible either through visits or in the excellent printed catalogues of a number of the collections. With museums and sites in Central Asia inaccessible to me these collections have been integral to the collection of material. They have been particularly important in gathering examples of base metal coinages that are under-represented on the coin market because of their susceptibility to corrosion and their perceived inferiority to their large, precious metal equivalents with the well-known portraits. A small number of private collectors were also kind enough to share images of their collections with me.

The majority of coins that appear in the study, however, were found in commercial numismatic publications. Much as it impacted upon the illustration of museum catalogues, the innovation of cheaper photography at the beginning of the twentieth century enabled auction houses to illustrate their sale catalogues with images of the coins they were selling. Often only coins considered to be highlights of the sale were illustrated, but the artistic excellence of the Graeco-Bactrian

[71] Holt (1999). Occasional mentions are made of die links, but no complete study is included.
[72] Kritt (2001). Kritt (2015) has since published a revised and enlarged study focusing mainly on coins from the Vaisali hoard and the implications for his previous model of the coinages.
[73] I have previously undertaken a die study of Eucratides I (Glenn, 2011), a king contemporary with Antimachus and usually considered to be one of the last Graeco-Bactrian kings.

portrait coins, as well as their exotic origin, meant that photographs were often included.[74] As photography became cheaper and the prices of the coins rose it became possible to illustrate every lot in the catalogue. Image quality differs quite significantly between different auction houses and dealers, with one of the most prolific dealers issuing lists with particularly low quality images. There are very few extensive collections of commercial numismatic publications in the world and I was very fortunate to be given access to the two best: the BCD Library in Athens, and the collection at the Fitzwilliam Museum in Cambridge. The study would be far poorer without the numerous coins gathered from these two excellent collections.

In the last fifteen to twenty years many auction houses and dealers have moved online, making very high quality photographs of the coins freely available. A particularly useful resource for such images is the Coin Archive website and its free to access equivalents. The ever increasing prices of ancient coins seem to have brought about a resurgence of interest in bronze coins, with many examples in my study only having appeared on the market in the last ten years. As we shall see later, the number of Graeco-Bactrian coins being sold on the coin market for the first time seems to have reached a peak in the mid-2000s, but there are still many offered each year (see Find Evidence). In order to complete the current study in a timely fashion it was necessary to set an arbitrary date after which I would not include further examples of coins. This date was 31st December 2013, although a very small number of particularly important coins were included from later sales.

Organising the coinage

Before studying the assembled coins for the links of shared die identity of different coins they were divided initially into different series and groups. As well as the potential for historical insight that these divisions provide, this also had a more practical purpose since it limited the number of coins that had to be compared with each other. Of course some of the most interesting examples of die linkage can

[74] On a number of occasions Graeco-Bactrian coins were listed in the publication but not illustrated. This study is not intended to be a complete record of the relevant coins. As a die study it is only possible to include illustrated coins. Unillustrated coins have also been excluded from the metrological analysis because of the possibility of the same unillustrated coin appearing multiple times.

come from examples of different series or groups, often providing valuable insight into the order of production. It is necessary here to explain properly the distinction between the terms 'series' and 'group' as used in the current study. Different series of coins tend to be relatively large assemblages with a significant feature unique to that group. This feature will very often have an implication as to whether the series was produced before or after other coins. For example, the tetradrachms of Agathocles have been divided into two series in the study. The coins of Series One have a reverse legend that reads: ΒΑΣΙΛΕΩΣ ΑΓΑΘΟΚΛΕΟΥΣ, while the legend of Series Two is: ΒΑΣΙΛΕΩΣ ΑΓΑΘΟΚΛΕΟΥΣ ΔΙΚΑΙΟΥ. The additional word allows the coins to be divided quickly and objectively. The epithet also suggests that the coins of Series Two were produced after those of Series One since it would be highly unlikely that, once adopted by the king, the epithet would be omitted and, just as persuasively, all of the coins of the following kings include an epithet in the legend. The term 'series' is therefore one that has clear chronological implications.

The division of coins into groups is often less clear-cut. In the current study the choice of identifying groups has been dependant on the monogram that appears on the reverses of the coins. The meaning of these symbols is far from clear and will be considered throughout the study. During the initial phase of analysis it became clear that the monograms had a procedural function of some sort. It was therefore a simple choice to make the monogram the first criterion for the identification of different groups within a coinage. The second, less rigid, consideration was perhaps an unusual feature in the type that was present consistently on coins with the same monogram. For example, the tetradrachms of Group I, II, and III of Euthydemus II all have reverses in which the type (in this case the arm of Heracles holding a wreath) divides the letters of the king's name in the legend. Such an unusual feature may indicate a shared model, however, the different monograms of the groups mean that they were kept separate. This example is an unusual one, since it became clear over the course of the study that the reverses of the coins often had very little variation when compared with the obverses. In some cases, there are major differences in the portrait type that may in fact be significant enough to constitute a series. For example, the tetradrachms of Euthydemus feature a consistent reverse legend and type while the obverse portrait of the king varies noticeably, from coins on which the king appears quite young in an idealised

depiction, to those where he is shown with naturalistic deep jowls and other features indicative (at least to a modern eye) of an older man.

Previous studies have identified the use of different 'portrait models' in the coins of the Diodotid kings as well as Euthydemus I.[75] Kritt suggested that models with particular features were the basis for the types of the coins and that these models were shared between the two or three mints he had identified. Since these same portrait models were in use at different mints, on dies that were clearly engraved by different die-cutters, they must have been produced centrally and then sent out to the different centres of production. They are an important feature of the coinages that allow the identification of separate stages of production.

Die catalogues

The undertaking of the die study was helped greatly by the use of software developed by Robert Bracey to organise and compare coins, establish die links, and then view the results. Each coin was uploaded with a photograph of either side. It was then given a unique identifying number, which it retains throughout the study. Even if a coin was removed from the study, for example when it was determined to be the same coin offered for sale at a different time, its number was reserved and deleted from the study. For ease of use each coin is listed with the die study number in the die catalogues, meaning that numbering is non-sequential and the total number of coins may not be the same as the highest numbered coin in the study. For reasons of time and space it was not possible to illustrate every coin or even die included in the study.[76] The die catalogues are included as an appendix.

Meta die analysis

Having established die links, one of the main ways in which the results of a die study can be used is in estimating the original size of the coinage. The number of obverse dies that was identified in the study can be used in various ways to achieve

[75] Kritt (2001), 73-79.
[76] Ariel and Fontanille (2012), a recent study of Herod's coinage, includes the best presentation of a die study of which I am aware, with the majority of coins illustrated alongside a wealth of information about die groups and other characteristics of the coins. Although exceptionally clear and useful, the work was not a quick one, having taken the two authors 12 years to complete. Unfortunately, with the time constraints on the current study, such a comprehensive presentation was not possible here.

this aim. Of course, the number of obverse dies known from extant coins (referred to as d_O) is not the same as the number of dies that was originally used in the production of a particular coinage (D_O). Various equations have been suggested to estimate the original number of obverse dies. These formulae only provide valid results with a suitably representative sample. Throughout the study the quality of the sample has been measured by the number of coins divided by the number of dies (n/d). As a simple rule of thumb any coinage with an n/d value of less than two has been considered insufficient for meta die analysis. Another consideration is that the sample of coins is a random one of those that were originally made. A number of coins from a single hoard, for example, can cause difficulties as those coins may over represent a single phase of production with numerous die links. With very few published hoards the problem of a skewed sample has not been regularly encountered, although one group of Antimachus tetradrachms has an extraordinarily high n/d, perhaps indicating that many of the coins came from a single hoard. It is essential to be cautious when dealing with the estimates in this situation.

In the current study the results of calculations from four of the different equations have been included at the end of the die catalogues for each coinage.[77] It is clear from the results of the different coinages across the study that the various equations produce consistent results: the Good equation always produces the lowest results, while Esty's 2011 formula always calculates the highest number of obverse dies originally used. The Carter equation and Esty's earlier version produce values in between, usually much closer to the higher range of Esty's 2011 formula. Good's equation should be discounted since it often assumes that the sample is almost complete. For example, in the tetradrachm study of Euthydemus II a total of 42 obverse dies were identified with a ratio of coins to dies (n/d) of 4.1. Good's formula estimated that the original number of obverse dies was 45.1, while Esty 2011 produced 55.4. For a coinage which is not one of the best samples in the current study it seems highly unlikely that only three more obverse dies remain to be found, as the result of the Good equation suggests. I have therefore used Esty's 2011 formula throughout the study as the way in which D_O has been calculated. In the conclusion the estimates produced by the Carter equation have also been used

[77] The relevant publications of the different formulae are: Good (1953); Carter (1983); Esty (1986) and Esty (2011).

to allow simple comparison with other published die studies, although often the difference between Carter and Esty 2011 is not significant.

Of course, the most intriguing number for historians is not the original number of obverse dies, but the original number of coins they produced. Attempts to calculate that number (N) are highly contentious. A variety of methods and sources have been used as the basis for different attempts. The only insight from the Greek world available to us comes from the Amphictionic lists at Delphi, which give the expenditure for a whole coinage. By studying the dies of the surviving coins and comparing this number with the epigraphic evidence Kinns was able to suggest a range of 23,333 to 47,250 coins per obverse die.[78] A more recent reinterpretation from an epigraphic standpoint may suggest a reduced quantity of silver resulting in a reduction in the number of coins per die to 14,350.[79] Another approach has been to look at the much more extensive evidence from mediaeval mints. Here records survive and have been used to suggest, for example, a range of 22,030 to 65,000 coins for English penny obverse dies in the late 13th and early 14th centuries AD.[80] Such a comparison is, however, probably misleading due to differences in production techniques, in particular the flan which was much thinner for pennies than the thick blank used for Hellenistic tetradrachms.

A more pragmatic method has also been adopted. Sellwood approached the problem by engraving his own dies and beginning to strike coins. The result of his experiment was the often-quoted figure of 8,000 coins per obverse die and 16,000 for each reverse.[81] More recently a French team struck many more coins over a number of seasons, recreating the whole production process of an ancient mint. The number of coins per die they suggested as representative was between 10,000 and 15,000.[82] Both estimates are substantially lower than those suggested above for pre-modern striking, a discrepancy attributed to the lack of experience of the re-creators, but one that should still be cause for concern. In fact, Thomas Faucher

[78] Kinns (1983), 18-19.
[79] Marchetti (1999), 104-109.
[80] Allen (2004), 49.
[81] Sellwood (1963), 229.
[82] Faucher *et al.* (2009), 70-78.

who was instrumental in the French experiments, has since suggested a productivity range of between 15,000 and 30,000 coins.[83]

We find, then, some level of consensus between the different estimates and, indeed, the figure of 20,000 coins produced with each obverse die has become something of a standard in recent years.[84] There are, however, many problems with extrapolating numbers of coins, and therefore the total weight of precious metal used in the production of a specific coinage. Buttrey, in particular, has been a consistent critic of such approaches focusing initially on the figure of 30,000 coins per obverse die, which had been calculated by Crawford in relation to the coins of the Roman Republic.[85] Later, Buttrey criticised the 20,000 figure as 'a fiction' and insisted that it was impossible to calculate an average figure for coin production.[86] The basis for this scepticism was the number of variables to be considered when attempting to estimate the average. Buttrey gave different conditions that could limit the life of a die, and for which any average would be unable to compensate.[87] Some of these limitations are directly relevant to the current study. Buttrey highlighted the assumption of the die life models that each die was used to destruction. The coins of the Graeco-Bactrians kings, however, rarely show serious die wear. Even die flaws are moderate, and only two major examples were identified in the study from the tetradrachms of Agathocles and the 'pedigree' issues of Antimachus, and even then on only one die of each king. They receive a significant amount of attention in the study simply because they are the exception. It is certain, then, that the dies used to strike the coins of the Graeco-Bactrian kingdom were not used until they broke.

Another of Buttrey's variables was the different nature of the flans being struck. He cited Sellwood's experiment in which the temperature at which the flans were struck significantly affected the life of the die. In the case of the Bactrian coins we do not know whether the coins were struck hot or cold. Buttrey also referred to the ratio of flan diameter to thickness, which strongly impacts upon die life. It is noted below that the fabric of the coins differs within the study as, under Demetrius and

[83] Faucher (2011), 125.
[84] Callataÿ (2000a).
[85] Buttrey (1993) and (1994); the initial proposal of the figure is to be found in Crawford (1974), 642-671.
[86] Buttrey and Buttrey (1997), 117-118.
[87] Buttrey (1994), 343.

Euthydemus II, the flans become more spread, and particularly under the latter king the type is struck in very high relief. These differences cannot be taken into account with a simple average. Finally, Buttrey discussed the possibility that the die might be taken out of use before its full deterioration because the information on it had expired. In addition to this he also pointed out that little is known about the different sizes of the orders for coin production, suggesting that a die may have fallen out of use simply because the required number of coins had been struck. These two variables can be linked for the purposes of the current study. One of the major findings of the die study has been to confirm the suggestion that obverse die links between coins with different monograms are very rare. The correct interpretation of these symbols is uncertain, but it will be argued below that they were in some way related to personnel at the mint, perhaps as a method of quality control. The fact that different obverse dies were used to strike coins with different monograms strongly suggests a break in the minting between the two different symbols, presumably related to some administrative change at the mint. In this case the obverse dies used for the first monogram were not used until the type became illegible; they were presumably destroyed at the end of a period of minting to prevent unauthorised use. Once more it is clear that any average figure would be deeply misleading.

A final problem is the potential for worn dies to have been re-cut to prolong their lives. The phenomenon of re-cutting is difficult to identify, and is only present for certain on a particular obverse die of Antimachus' 'pedigree' series. At what point the die would be re-cut would have been a subjective decision (as would the end of its life) which could have varied substantially between different mints and personnel. For all these reasons any attempt at estimating the number of coins produced by the Graeco-Bactrians kings is impossible and will be avoided in this study.

Instead of discussing the number of coins (N) originally produced, I have presented figures of the estimated number of obverse dies (D_O). This approach has been adopted in many recent studies as a way of comparing the relative sizes of different coinages.[88] Although Buttrey has expressed concerns about even the comparison of

[88] See, for example Callataÿ (2005) and Callataÿ (2013).

die estimates, they can be very useful when presented with the required caveats, and this is the approach taken in this study.[89]

Inter die analysis

The links created in the die study can themselves be analysed. Die groups, consisting of coins with shared die identity, can be of varying levels of complexity. The clearest way to present and, indeed, think of these die groups is to draw them as graphs (**fig. 5**). On a simple level, two dies linked together is a die combination. Such a feature is present on every coin. The next type is the most common sort of die group, that which consists of a single obverse die with multiple reverses; because the reverses share a single obverse they are said to be linked. The reverse die was exposed to the full force of the hammer during the striking process and therefore did not last as long as the obverse, meaning that many more reverse dies were used than obverses. Although the single obverse group links dies together it is still an isolated group, and as such cannot tell us a great deal in terms of inter-die analysis. On the other hand, a die group with multiple obverses allows a relative order of minting to be determined between different dies. If different coins show varying stages of wear (see Intra die analysis below) it is possible also to establish a chronological order of minting. Such die groups are particularly interesting and are the basis of many of the important conclusions of a die study, beginning to provide a fuller picture of how the coins were produced.

[89] Buttrey (2011). In particular, the organisation of the production of a coinage can still cause problems for comparisons based on the estimated number of obverse dies.

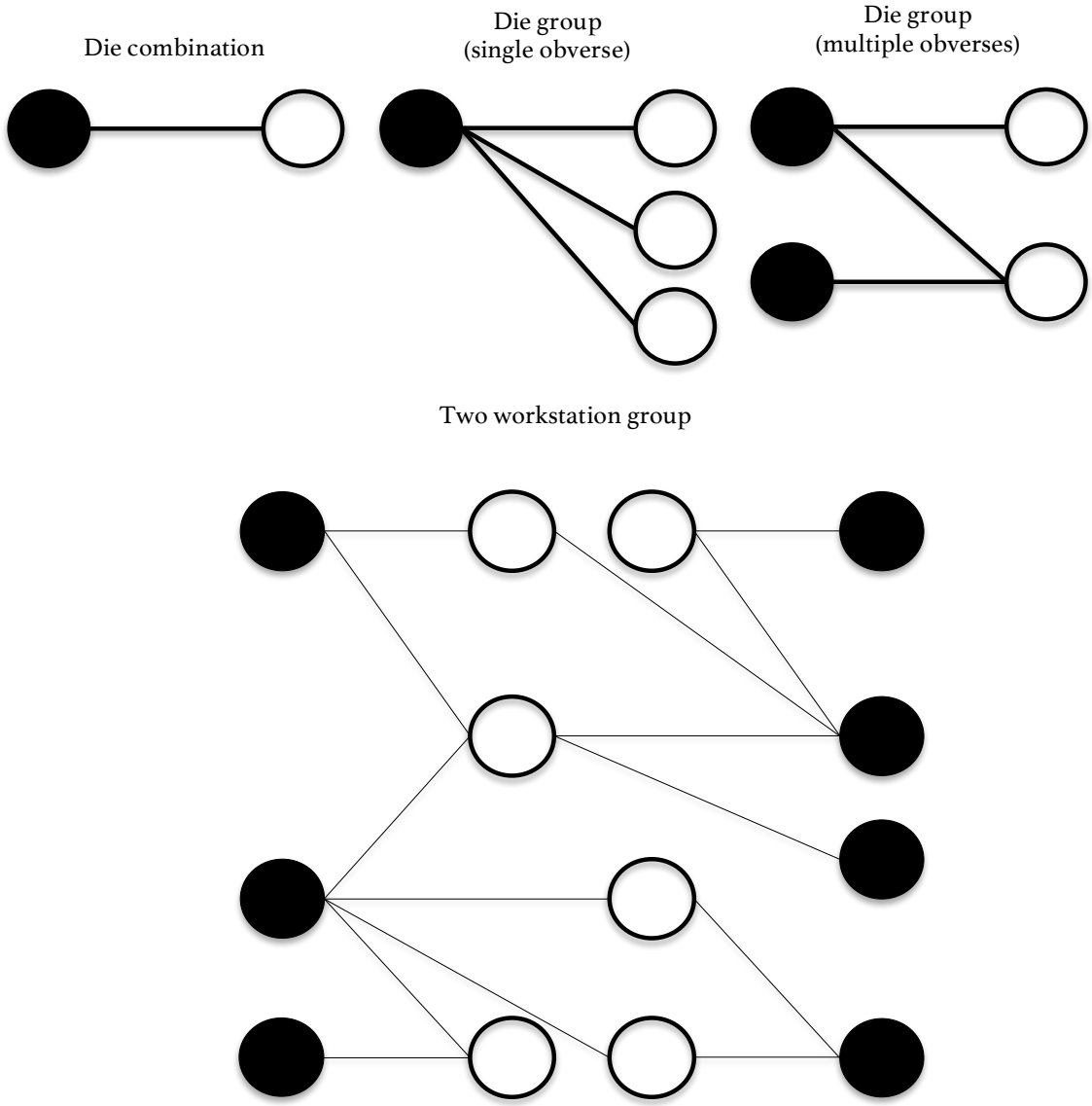


Figure 5: Die groups. Obverse indicated by black circles, reverse shown as white.

Workstations

The final group illustrated in **fig. 5** is of a more complex nature. It has long been recognised that the production of coinage in the ancient world had different rhythms, as well as simply a volume.[90] On a number of occasions throughout the course of the study it became clear that there were some die groups that it was not possible to explain as organised in a similar fashion to the groups already discussed with a single, linear group of obverses. Until now we have considered groups that were struck with one obverse at a time. An obverse die was inserted into an anvil

[90] Hackens (1975).

and used with a number of reverse dies until the obverse was replaced, for whatever reason. It is possible, however, that some groups were struck in parallel with more than one anvil (also referred to as a workstation). This is the phenomenon that is illustrated above. When drawn as graphs, illustrating each link as a line between the coins, these more complex groups initially resembled a spider's web with many criss-crossing lines. It became clear that it was possible to rearrange these groups with no lines crossing (otherwise suggesting an invalid arrangement) if obverse dies were arranged into two separate lines, representing the two different anvils. Such a phenomenon has been noted in other Greek coinages.[91] It has also been identified in a study of the coins of the Kushan ruler Wima Kadphises.[92] The use of a 'die box' is presupposed.[93] Two obverse dies would be placed in two different anvils and coins struck with two reverses. Perhaps the next day the obverse dies would remain in the anvils, but the reverses may have been swapped round, having been stored in the 'die box', and were then used with a different obverse from that of the day before. The identification of this sort of production is important because it is evidence that the speed of striking the coins was important. It would have cost more to produce these coins, since a second team would have been needed to operate the second anvil, but the output would have been quicker. In other words, speed of production was being prioritised over the cost.

In some cases, the die links of certain groups were so complex it was impossible to arrange them in a way that assumed two anvils were in use (i.e. the graph was non-planar in that it could not be drawn without crossing lines). In particular, the current study provides evidence for the use of three and four different workstations (see Antimachus chapter). Robert Bracey is currently preparing an article on this phenomenon and his help was instrumental in interpreting the relevant groups in the current study.[94] Since the ability to construct and analyse such complex graphs, through the use of computer software, has only recently become widely available, the identification of this phenomenon is limited to the recent works of Bracey and Carroccio, meaning that it is impossible to tell how common a feature the use of multiple workstations was in Antiquity.

[91] Carroccio (2011).
[92] Bracey (2009).
[93] Esty (1990), 207-210.
[94] Bracey (forthcoming).

Intra die analysis

On some occasions it has been possible to compare the coins struck by a particular die and then identify an order of minting. This process of intra-die analysis has been undertaken throughout the study, but, for a number of reasons has not been particularly fruitful. The identification of die wear, as already suggested, as opposed to wear on the surface of the coins is often very difficult. To be certain of the conclusions it is preferable to be able to examine the coin, or at least a high quality photograph, either option being all too rare. A die flaw can be helpful, since its progression can be traced across coins, with an indication, as it grows, as to the order of striking. As mentioned above, however, the existence of die flaws on these coins is very rare. Stress marks in the metals are often visible, as the die deteriorated after striking more and more coins. These marks have been the most common feature that has enabled intra-die analysis, although it was often possible only to classify coins as 'worn' or 'unworn', with multiple examples in each category rather than creating a linear, chronological order for their striking. Such conclusions are indicated, where particularly important, in the text, as well as throughout the die catalogues.

A new approach

As we have seen, the historiography of the Graeco-Bactrian kingdom has often relied on a dubious methodology. Although the literary sources are extremely limited, attempts have been made to piece together a narrative solely on the basis of the evidence they provide.[95] The most popular approach, however, has been to study the many coins of the period in whatever way in an attempt to glean any possible information that can then be linked to the literary evidence. For Tarn this often meant analysis of the coin portraits and then significant assumptions, sometimes based on the better known history of other Hellenistic kingdoms. More recently, with the discovery of archaeological sites and, in particular Aï Khanum, other attempts have been made at writing the history of Bactria, with those of Frank Holt and Brian Kritt being the best in their treatment of the numismatic evidence. Both, however, fall into a similar trap as Tarn by assuming that the sound

[95] Sidky (2000) is the most notable version of this unsuccessful approach.

information they obtain from their close studies of the coins can be made to fit with other categories of evidence to form an overarching historical narrative. As we shall see, this is a particular problem with Euthydemus I for whom we have a single fixed date and event (the siege of Bactra in 206). This single chronological point is then used as the basis of any reconstruction with a significant change in the king's coinage assumed to be linked to this event. Such an approach is clearly problematic and can lead to unfounded conclusions.

It is the aim of the current study to begin with a *tabula rasa*. The other sources of evidence have been considered and the extremely limited information they give us has been detailed. It is time now to turn to the coins. My approach, however, is not one in which a grand historical narrative can be created. Instead it is something akin to microhistory.[96] In a similar way to Holt's suggested 'cognitive numismatics', it must be assumed from the beginning that the coins in a die study, especially one of coinages with little other evidence, can initially only tell us about the system and people who produced them. Once the minting process has been understood and reconstructed in some sense it may be possible to reach some historical conclusions, but such conclusions should not be overstated. In fact, more often than not the result of the current study has been to rule out previous suggestions. It is therefore intended as a new approach to a very important body of evidence that has previously been badly-treated.

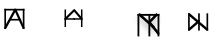
The coins of each king will be dealt with in separate chapters, with the exception of Pantaleon whose coins are placed with the similar issues of Agathocles. Previous numismatic scholarship is considered, then a new arrangement of the coinage proposed. Below is an abbreviated example of a table similar to those included at the start of each chapter summarising the output of the relevant king. They provide a helpful overview of the coinage as a whole by indicating the metals used as well as the spread of denominations that was struck. In addition to this the number of examples of each denomination is given (n),[97] as is the range of weights of those

[96] The term is used here in a somewhat different sense to its normal application in cultural and social history (Iggers 2005, 101-117).

[97] It should be noted that n is not necessarily the same as the number of coins that have been included in the die study. Occasionally the weight of coins was included, while their general state of preservation made establishing die identity impossible, leading to their exclusion from the die analysis.

examples, followed by a mean weight. The next column shows the standard deviation of the weights around the mean, a larger value indicating a wider spread and a less consistent weight of the coins in the study. Next is the n/d value for the study, showing how many coins are included against the number of dies that have been identified on them. The higher the number in this column, the more representative the study with more examples of each die. As a rule of thumb denominations with a value less than two should be treated with the utmost caution, particularly when drawing conclusion from the penultimate column. This shows the estimated number of obverse dies used in the original striking of the coins in the study calculated using the 2011 revision of Esty's formula.[98] As is clear from this table it is often not possible to calculate a value for this column because of the poor sample of certain denominations in the study. Other numbers, although included, should not be taken as firm estimates. On some occasions the number of obverse dies identified in the study (d_O) is given in this column to give the reader an idea of the size of the coinage without providing a potentially misleading estimate. The final column shows all of the monograms that appear on the reverse of the coins of each denomination, a feature which was particularly important when dividing the coins into different groups.

Table 1: Example of system of coinage.

Denomination	n	Weight range (g)	Mean weight (g)	Standard deviation	n/d_O	D_O	Monograms
AU Octodrachm	1	32.73	n/a	n/a	n/a	n/a	
AU Stater	17	8.09-8.68	8.27	0.14	3.4	7.1	

For ease of reference and comparison an illustration of the reconstruction of the production of each king's coinage is included at the end of each chapter. The example of the production of Pantaleon's coinage is given below (**fig. 6**). Pantaleon's coinage is the least complicated of all the kings in the current study. Denominations are grouped together under the mint to which they have been attributed. Within the division of each mint the different groups are labelled

[98] Esty (2011).

alongside the monogram or monograms that appear on those coins. Finally an attempt to indicate the original size of the output of each group is given. In ideal cases this is calculated using Esty's 2011 formula and labelled as D_O. As mentioned above, however, such an estimate is not always possible and in these cases either the number of obverse dies identified in the study (d_O) is given, or in cases of very poorly-represented denominations the number of coins known (n) is included. These diagrams are particularly helpful for illustrating features that appear at different mints at similar times that have important chronological implications. They also provide an easily accessible reference for the system of production and it is hoped they will be of particular use in testing historical reconstructions of the different kings' reigns.

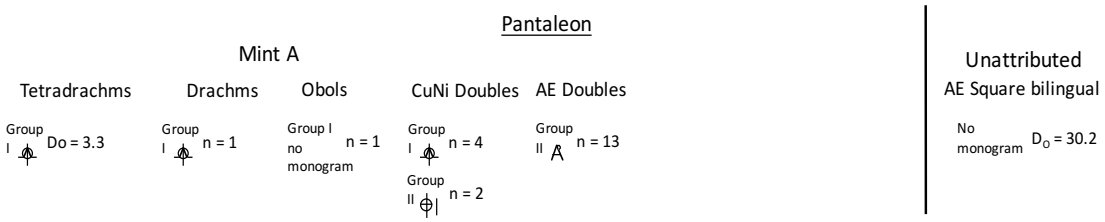


Figure 6: System of coinage under Pantaleon.

Chapter II: Types, Denominations, and Iconography

By the time of the Graeco-Bactrian kingdom the tradition of coinage was very well established in the Greek world. From its beginnings as a practical medium by which the *polis* could receive income and make payments, coinage grew quickly into an international phenomenon with the copious coinage produced by Alexander the Great assuming the role of a widely circulated trade coinage from the earlier Athenian 'owl' tetradrachms. The innovations of Alexander were continued by his successors and fixed a certain tradition that remained in place, with some variation, throughout the Hellenistic period.[99] One of the most important developments was Ptolemy I's use of his own image on his coins starting a convention of numismatic ruler portraits that lasts to this day.

Convention is an extremely important factor in the adoption and use of coin types. The concept of a coinage tradition allows numismatists to envisage a wider cultural picture into which an individual series of coins fits.[100] The vast majority of the coins in this study conform to the Greek tradition of coinage with types and a weight standard that were set as the norm in the Hellenistic world after the death of Alexander the Great. Coinage had been used in the Achaemenid empire, but its adoption was limited to the western satrapies of Asia Minor. In the central and eastern areas *hacksilber* remained the usual method of exchange involving precious metals.[101] The Chaman-i-Hazuri hoard provides a sample of the different types of coinage that were in circulation in Bactria before the arrival of Alexander.[102] Some coins simply imitated the types of the widely dispersed and greatly produced Athenian tetradrachms, while others made use of non-pictorial types stamped on the metal by dies. A particular variant of this latter sort was bar-shaped with two die stamps at either end, and was to become the model for the beginning of coinage in India, a tradition which was in turn modified to produce coins of a very different nature under Pantaleon and Agathocles.[103]

[99] Meadows (2014), 174-182.
[100] Cribb (2007), 334.
[101] Carradice and Price (1988), 35.
[102] Curiel and Schlumberger (1953), 31-45.
[103] Cribb (1985).

There is little evidence to show that Alexander's coins circulated in Bactria during his lifetime.[104] His coins were, however, part of the Oxus Treasure, indicating usage after his death in addition to the many posthumous issues produced by the Diadochoi, some of which have been found in hoards from Bactria.[105] It was these coins with their adherence to the Attic weight standard and the types of an obverse bust of Heracles wearing the lion scalp and the reverse type of Zeus enthroned that set the local understanding of coinage. Further west it took some time for the types of these coins to be adapted under the Successors with Ptolemy I being the first to put his own portrait on the obverse of his coins.[106] He was followed slightly later by Demetrius Poliorcetes.[107] Both portraits gave the kings divine attributes: the *aegis* in the case of Ptolemy and a bull's horn on the coins of Demetrius. After the first generation and a half the use of such attributes declined, and they are not present on the coins of the kings in this study.[108]

Under the Ptolemies and Seleucids two quite different approaches were taken to the portraiture that was to appear on their coins. In Egypt the image of the founder, Ptolemy Soter, took pride of place on the silver tetradrachms produced throughout the period of the dynasty's rule.[109] This was also the approach of the Attalids on whose coins Philetaerus is shown.[110] Under the Seleucids, however, portraits of the current king (and sometimes queen) were preferred and it was this fashion that was followed by the kings who ruled in Parthia and Bactria.

As well as the shift to ruler portraits the inclusion of a certain attribute, the diadem, became an essential indication of kingship. Although the exact origin and significance of this strip of white cloth worn tied around the head is unclear, it was certainly the most important symbol of Hellenistic kingship, and clearly a very potent one for the Graeco-Bactrian kings.[111] Many of the other standard features of the 'typical Hellenistic royal portrait' (those of sculptures as well as coins) are also present on the Graeco-Bactrian coins. The slight upward turn of the head, the lack

[104] Cribb (2007), 336-337.
[105] Bellinger (1962); Petitot-Biehler (1975).
[106] Lorber (2012a).
[107] Mørkholm (1991), 27.
[108] Smith (1988), 45.
[109] Svoronos (1904).
[110] Westermark (1961).
[111] Smith (1988), 34-38; Strootman (2007), 366-372; Dumke (2012).

of a beard, the hair, 'generally curly, quite long (though not covering the ears), and arranged in casual disarray.'[112] These coins, which have been described as being 'among the finest works of art surviving from the Hellenistic age',[113] are among the most accomplished ever to be produced; the standard of engraving of the portrait has rarely (if ever) been surpassed.[114]

The reverse types of these coins are just as accomplished. Very often in the early Hellenistic period the types of the coins of the Diadochi consisted of a portrait of the king on the obverse and some form of dynastic badge on the reverse, an eagle perched on a thunderbolt for the Ptolemies and for the Seleucids, a seated Apollo.[115] The coins minted in Bactria, following Diodotus' move to independence, still followed this familiar appearance, perhaps not surprising if we consider the main use for the larger denominations to be military pay, the ruler portrait reminding the soldier to whom he owed his loyalty.[116] Diodotus I and II continued to issue coins in the same style as the Seleucid Empire from which they had recently gained their independence, both in terms of iconography and denominations. The reverse type of Antiochus II was, however, changed from Apollo to a depiction of Zeus hurling a thunderbolt, while apparently retaining the obverse ruler portrait of the Seleucid king before replacing it with their own portraits.[117]

Types and denominations

Table 2 below includes all the known issues of the Graeco-Bactrian kings from Euthydemus I to Antimachus I. Each denomination is listed with its obverse and reverse types as well as any legend. The types of the so-called 'pedigree' issues of Agathocles and Antimachus are not given in detail since they copy the images used on the coins of the king whom they commemorate. The denominations and the different metals issued under the kings vary considerably. The system of coinage used by Euthydemus I differs very little from that of his predecessor Diodotus, and is still of a very standard Hellenistic, or more specifically, Seleucid nature. Gold, silver, and bronze coins were all produced. The gold stater on an Attic weight

[112] Smith (1988), 46.
[113] Jenkins (1990), 153.
[114] Grierson (1975), 16; Mørkholm (1991), 181.
[115] Newell (1937); Davis and Kraay (1973), 270-277.
[116] Smith (1988), 13-14.
[117] Bopearachchi (1991), 147-153.

standard follows in the tradition of coins introduced by Philip II of Macedon, and continued under Alexander and the Successors.[118] Euthydemus I was the only Graeco-Bactrian king until Eucratides I known to have produced gold coins. The apparent lack of continuity in their production suggests that they did not have a regular status in the system of coinage used in the kingdom, but whether they had a commemorative nature or were 'emergency' issues is not clear.

Much like the model of the coin types the different denominations of silver coins are also very typical of those produced by various Hellenistic states. The tetradrachm had long been the standard silver denomination in the Greek world, and it seems to have been produced in considerable numbers under Euthydemus. Likewise the smaller silver denominations of drachm, hemidrachm, obol, and hemiobol were standard issues. The appearance of a gold octodrachm is more surprising. As had become the norm under Seleucid kings, Euthydemus also struck a series of bronze coins, which all shared the same type, in addition to his precious metal issues.

The denominations of the bronze coins issued by the Graeco-Bactrian kings are far from clear. The mean weight of the examples collected in the course of the study is given in the table of the system of coinage for each king in the appropriate chapter, while histograms are provided where the sample size is sufficient. Even with this data it is often difficult to identify the weight for which the mint was aiming. The level of precision of the weights of bronze coins was significantly lower than that of silver. Since the latter metal had an intrinsic value any weight over the necessary standard was a direct financial loss to the issuing authority, a problem that was not present in the production of the fiduciary bronze coinage.

The bronze coins do, however, have weights that clearly have a relationship with one another and have been assumed to be on the Attic weight standard.[119] The names of the different denominations (unit, double, triple etc.) used by Bopearachchi in his *catalogue raisonné* have been retained in this study. They give an accurate representation of the weight of the coins, although they should in no way be taken to reflect upon the value of the different denominations. For example,

[118] Le Rider (1977), 407-412; Price (1991), 29-31; Svoronos (1904); Houghton and Lorber (2002).
[119] Cunningham (1884), 310 ff.; MacDowall (1975), 45.

the bronze 'unit' denomination has an average weight of *c.* 4.2 g, while that of the 'double unit' is *c.* 8.4 g, twice as much. We should not assume, however, that the 'double unit' had a value twice that of the 'unit'. There is no evidence for the value of these coins and these names have been retained solely for the ease of the reader, while avoiding the implications of the use of the term *chalkous*.[120] Elsewhere in the Hellenistic world the diameter of the bronze coins is a clearer indicator of their denomination.[121] The evidence for the Graeco-Bactrian kingdom is less certain. Other than Euthydemus I the base metal coins produced under the kings in this study made use of different types for each denomination, eliminating any need to distinguish the value of the coin by its diameter. In the case of the 'doubles' and 'units' of Euthydemus, although the coins featured the same types the clear difference in weight between denominations would have removed any possibility of confusing the two.

Demetrius continued the minting of coins of a similarly Greek nature. He issued a reduced range of silver coins: tetradrachms, drachms, and obols. While increasing the size of the bronze coins that were produced. A double unit, triple unit, and a sextuple unit are all known, each with different types. The values of the bronze coins remain unknown. An increase in the number of bronze denominations and a decrease in the small silver coins is to be expected because of the relatively high cost of producing small silver coins, and would indeed be in line with the systems of coinage in other parts of the Greek world at this time. It seems, however, that Demetrius did not produce small denomination bronze coins either. This may perhaps provide an insight into the way in which these coins were used: a full monetary economy would not be possible without the 'small change' to facilitate lower value transactions.

The different denominations and metals used by Euthydemus II, Agathocles, and Pantaleon, like the types and portraits on the coins themselves as we shall see below, share many similarities, an observation that has led to the suggestion that

[120] Recently denominations have been labelled in a more neutral fashion with letters. See for example Houghton and Lorber (2002) and Hoover (2013). This approach more accurately reflects the state of our knowledge of the various denominations, but can cause much confusion when consulting earlier publications.
[121] Houghton and Lorber (2002), vol II, 4-36; Faucher (2013), 238.

Pantaleon and Agathocles were brothers.[122] Euthydemus II produced only coins with a Greek legend, and with Greek types, in silver and cupro-nickel. Agathocles and Pantaleon produced bronze coins in addition to the other two metals. They were also the first kings to mint coins on a non-Greek weight standard with legends in Greek on one side and Brahmi on the other. These coins are square or rectangular in shape, and presumably were produced to fit into a local tradition of coinage that was different from the Greek system of the earlier kings.

The use of a cupro-nickel alloy in coins is unattested before these kings. Much of the scholarly discussion of this new metal has centred on attempts at composition analysis, and discussion of whether or not the alloy came from a Chinese source.[123] Whatever the origin the introduction of a new metal is a very significant departure. The cupro-nickel coins make use of the same types as the copper issues, but the respective values of the two metals is unclear. It was originally suggested that these coins were produced as an alternative to silver obols by these three kings.[124] On this basis, a cupro-nickel double unit would be the equivalent of one silver obol. More recently, however, obols minted in the name of Euthydemus II and Pantaleon have been discovered.[125] Cupro-nickel coins were only struck under Euthydemus II, Agathocles, and Pantaleon, and their production was not continued by later kings. The fact that they seem to fit into the system of denominations around the value of an obol suggests that they may have been produced as a way of reducing the output of small silver denominations, although why this would be necessary in addition to an already well accepted bronze coinage is uncertain. A final possibility, discussed in greater detail below, is that the metal used in the coinage was not one which held a premium value over bronze, simply it was mined from a source with a different composition of elements.

Under Agathocles a series of coins with what have been referred to as 'pedigree' types was struck. These coins copy the types of some of the king's predecessors (Pantaleon, Demetrius, Euthydemus I, Diodotus I and II, Antiochus II, and

[122] Narain (1957), 59.
[123] In favour of Chinese influences see Cheng and Schwitter (1957); against Cammann (1958). The Chinese connection seemed to have been thoroughly disproved (Cowell (1989)), only to have been resurrected recently (Widemann (2009), 93-100).
[124] Cunningham (1884), 308.
[125] *BNBact* Euthydemus II série 4; *BNBact* Pantaleon série 3.

ultimately Alexander). Both the obverse portrait of the original king and the reverse type are reproduced. The only change comes in the legend where a participle is used: ΒΑΣΙΛΕΥΟΝΤΟΣ / ΔΙΚΑΙΟΥ / ΑΓΑΘΟΚΛΕΟΥΣ. The appearance of an epithet is another innovation, and depending on the dates of Agathocles' reign, may actually precede a similar adoption by the Seleucid kings.

Under Antimachus we find a slight change to the system of coinage. The standard series of silver tetradrachms and smaller denominations is once again present, as is a single denomination of bronze double units. The 'pedigree' coins appear once more, although this time only with the types of Euthydemus I (Theos) and Diodotus Soter. After Agathocles' seemingly large issues of bilingual rectangular bronze coins, only one surviving series of an unknown denomination bronze coin with a rectangular flan minted under Antimachus survives. Although this coin is rectangular, it does not feature an Indian legend, only a Greek one. Once again, with only two different series of bronze coins, it seems that under Antimachus the output of coinage was concentrated on larger denomination silver coins.

Table 2: Types and denominations.

King	Metal & Denomination	Obverse Type	Reverse Type
Euthydemus I	*AV* stater	Diademed head of the king facing right	Heracles facing left seated on rock holding club, which rests on a pile of rocks ΒΑΣΙΛΕΩΣ / ΕΥΘΥΔΗΜΟΥ
	AV octodrachm	As above	As above
	AR tetradrachm, drachm, hemidrachm, obol, hemiobol	As above	As above
	AE double unit, single unit, half unit	Head of bearded Heracles facing right	Prancing horse to right ΒΑΣΙΛΕΩΣ / ΕΥΘΥΔΗΜΟΥ
	AE quarter unit	As above	Head of horse ΒΑΣΙΛΕΩΣ / ΕΥΘΥΔΗΜΟΥ
	AE half unit	As above	Trident ΒΑΣΙΛΕΩΣ / ΕΥΘΥΔΗΜΟΥ
Demetrius I	*AR* tetradrachm, drachm, obol	Diademed head of the king facing right wearing elephant scalp (helmet?)	Youthful, clean-shaven Heracles, standing, crowning himself and holding club ΒΑΣΙΛΕΩΣ / ΔΗΜΗΤΡΙΟΥ
	AE double unit	Head of bearded Heracles facing right, club over shoulder	Artemis standing facing, head radiate, holding bow ΒΑΣΙΛΕΩΣ / ΔΗΜΗΤΡΙΟΥ
	AE triple unit	Head of elephant facing right, trunk raised with bell around neck	Caduceus ΒΑΣΙΛΕΩΣ / ΔΗΜΗΤΡΙΟΥ
	AE sextuple unit	Round shield with Gorgon head on	Trident

King	Metal & Denomination	Obverse Type	Reverse Type
		shield boss	ΒΑΣΙΛΕΩΣ / ΔΗΜΗΤΡΙΟΥ
Euthydemus II	*AR* tetradrachm, drachm, hemidrachm, obol	Diademed head of the king facing right	Heracles standing facing, wearing wreath, holding another wreath in right hand, club and lion skin in left ΒΑΣΙΛΕΩΣ / ΕΥΘΥΔΗΜΟΥ
	CuNi triple unit, double unit, single unit, *AE* triple unit, double unit	Laureate head of Apollo	Tripod ΒΑΣΙΛΕΩΣ / ΕΥΘΥΔΗΜΟΥ
Pantaleon	*AR* tetradrachm, drachm, obol	Diademed head of the king facing right	Zeus seated on a throne holding a sceptre in left hand, in right Hecate holding two torches ΒΑΣΙΛΕΩΣ / ΠΑΝΤΑΛΕΟΝΤΟΣ
	CuNi double unit, *AE* double unit	Bust of Dionysus facing right wearing wreath, thyrsus over shoulder	Panther standing touching vine with raised paw ΒΑΣΙΛΕΩΣ / ΠΑΝΤΑΛΕΟΝΤΟΣ
	AE bilingual rectangular flan, uncertain denomination	Female deity in oriental costume holding flower (lotus?), making dancing movement? *Rajane (Rajine) / Pamtalevasa*	Lion standing facing right ΒΑΣΙΛΕΩΣ / ΠΑΝΤΑΛΕΟΝΤΟΣ

King	Metal & Denomination	Obverse Type	Reverse Type
Agathocles	*AR* bilingual rectangular flan	Male deity (Samkarshana?) standing facing wearing long garments, boots with upturned toes and elaborate headdress, holding ankus and sword ΒΑΣΙΛΕΩΣ / ΑΓΑΘΟΚΛΕΟΥΣ	Male deity (Vasudeva-Krishna?) with similar garments standing facing, holding wheel and uncertain object *Rajane / Agathuklayasa*
	AE rectangular flan uncertain denomination (weights from 10g to 17g)	Female deity in oriental costume holding flower (lotus?), making dancing movement? *Rajane (Rajine) / Agathuklayasa*	Lion standing facing right ΒΑΣΙΛΕΩΣ / ΑΓΑΘΟΚΛΕΟΥΣ
	AE irregular flan, unknown denomination (weights from 4g to 6g)	Six-arched hill with star or sun above *Akathukreyasa*	Tree in square enclosure *Hiranasame*
	AR tetradrachm, so-called 'pedigree' series of varying types copying those of previous kings	Alexander/Herakles, Antiochus Nicator, Diodotus Soter, Diodotus Theos, Euthydemus I, Demetrius I, Pantaleon	Zeus, Zeus, Zeus, Zeus, Heracles, Heracles, Zeus ΒΑΣΙΛΕΥΟΝΤΟΣ / ΔΙΚΑΙΟΥ / ΑΓΑΘΟΚΛΕΟΥΣ
Antimachus I	*AR* tetradrachm, drachm, hemidrachm, obol	Diademed head of the king facing right wearing *kausia*	Poseidon standing facing holding long handle trident ΒΑΣΙΛΕΩΣ ΘΕΟΥ / ΑΝΤΙΜΑΧΟΥ
	AE double unit	Elephant standing facing right	Nike holding palm and wreath ΒΑΣΙΛΕΩΣ / ΑΝΤΙΜΑΧΟΥ
	AE rectangular	Elephant standing	Thunderbolt lying

King	Metal & Denomination	Obverse Type	Reverse Type
	flan, unknown denomination	facing to left or right	horizontally ΒΑΣΙΛΕΩΣ / ANTIMAXOY (Occasionally with cursive omega)
	AR tetradrachm, so-called 'pedigree' series of varying types copying those of previous kings	Diodotus Soter, Euthydemus I	Zeus, Heracles ΒΑΣΙΛΕΥΟΝΤΟΣ / ΘΕΟΥ / ANTIMAXOY

Obverse Types

Euthydemus I

The obverse type of Euthydemus' precious metal coins, in line with Seleucid and the wider Greek tradition is a head of the king himself. Although only minor changes are noted in the reverse types of these coins (the main being the slight difference in the position of the club on Heracles' knee), the obverse portraits display notable variation. The progression from seemingly youthful portraits, through middle-age, to the aged representation of the king is a well recognised feature of Euthydemus' coinage and one which is usually taken to indicate a long reign over the course of which the king is depicted realistically ageing on his coins.[126] In the so-called youthful types the king is shown in something of an idealised depiction. Particularly distinct is the smooth, taut line of his jaw, as well as a nose that comes to a very clear point. The sweep of the eyebrow and the king's unrealistically large eye lend the type an almost cartoonish quality. The king's hair is engraved in great detail, with an Alexander-like *anastole* at the front. Finally, the diadem is given a very prominent place in the portrait. It is not obscured by any of the king's hair, and is only slightly tucked behind the king's ear while one of the ties flutters behind the head. The engraver made absolutely certain that the diadem can be quickly and easily recognised on these coins.

[126] See for example, Bivar (1951) and Kritt (2001), 76-77.

The very distinctive look of these 'youthful' coins of Euthydemus shares many characteristics with the coins of his predecessor Diodotus (**fig. 7**). The peculiarly large eye and the sweep of the eye brow, as well as the pointed nose and chin all seem heavily influenced by the preceding coins of Diodotus. Even the diadem ties flutter in a similar manner.

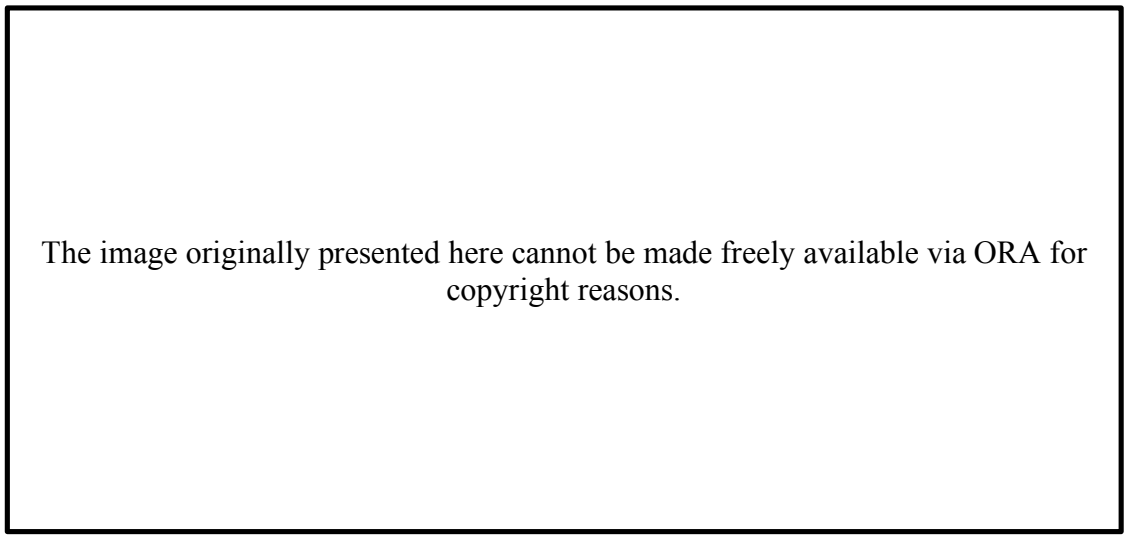


Figure 7: Left: obv. tetradrachm of Euthydemus I with 'youthful' portrait (Spink 8/10/2003, 129). Right: Gold stater of Diodotus I (Noble Numismatics101 20/1/2012, 3321). N.B. test cut.

The importance of these similarities between the two issues is more difficult to analyse. Are the shared features of these coins to be ascribed to the same die engraver, suggesting a continuation of minting personnel between different kings? Or, was a different engraver responsible for the two types, but since the king did not have a recognised portrait type at the start of his reign, was the new type copied directly from previous issues? If the latter, the traditional interpretation of the ageing of Euthydemus on his coins does not have to be adhered to. Recent die linking evidence suggests that there was some overlap between the coinage of the Diodotoi and Euthydemus, and therefore that the so-called 'youthful' portrait came first.[127] This discovery and its implications are discussed further in the Euthydemus chapter.

[127] Zeng (2013).

Figure 8: Obv. tetradrachm of Euthydemus I with 'middle-aged' portrait (BM India Office Collection 2)

The 'middle-aged' types of Euthydemus (**fig. 8**) still share the pointed nose and chin of the earlier issues, but with a more regular hairstyle. The individual strands of hair are shown in high relief with the rest of the hair, giving a much less natural appearance than before.

A final group of coins shows the king with a much more naturalistic and aged portrait (**fig. 9**). He retains his stern expression, but here the eye and many facial details are achieved with a far more realistic detail, and perhaps a physiognomic accuracy. The king's nose and chin are still relatively large, but much less unrealistically pointed than in the youthful portrait type. His face begins to sag slightly with age, as does his neck. Finally the engraver has shown the interaction between the diadem and the hair on top of which it has been tied. Here a number of strands flow over the top of the cloth, and a few bulge slightly as they are gathered under it. The diadem ties, however, are still engraved in the same way as before: flowing behind the king's head. It is once again impossible to miss this important symbol of regal authority. This was the portrait Tarn was thinking of when he wrote of Euthydemus, 'one has only to look at his face to see why he seized the crown: he meant to rule because he could.'[128]

[128] Tarn (1951), 75.

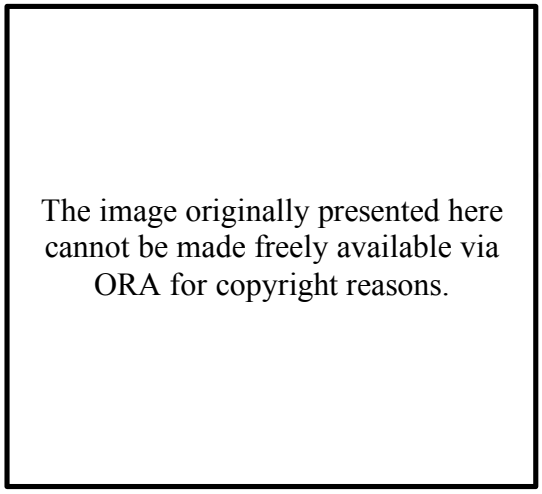


Figure 9: Obv. tetradrachm of Euthydemus I with aged portrait (BM 1888.1208.76)

The 'aged' types of Euthydemus have often been interpreted as representing a realistic portrayal of the king and have been used to identify a particularly unusual bust, the Torlonia 'Euthydemus'.[129] This head is that of an older man wearing a wide brimmed hat. The face itself is heavily wrinkled and quite fat, and as such is very unlike Hellenistic royal portraiture in which an idealised, often youthful image of the king is presented. On first glance the head shares a resemblance to the older portrait types of Euthydemus in which the king's skin is wrinkled and his mouth is turned downwards. Such a superficial approach is, of course, dangerous and it is far more likely that the head is that of a late Republican commander.[130]

The simple fact that a major factor in the supposed attribution of the head was its unflattering style and aged appearance indicates just how rare such an approach to royal portraiture was in the Hellenistic period.[131] Until this point numismatic portraits of Hellenistic kings had been idealised with very little trace of the realistic features we find here. These coins are the start of the celebrated Bactrian portraits. Why such a departure from the usual Seleucid tradition that had been continued

[129] Six (1894).
[130] Smith (1988), Appendix IV, who objects particularly to the attribution on the basis of the shape of the nose of the sculpture.
[131] Unlike other Graeco-Bactrian kings Euthydemus has also been suggested as the subject of another portrait image. The diademed clay head was found at Takht-i Sangin and shows an idealised, youthful Hellenistic ruler (Litvinskiy and Pichikyan (1980), 64). Holt (1999), 131, n. 19, identified this head as a 'possible portrait of Euthydemus'. Its idealised features help little in identification and such an attribution is unlikely, certainly given the later realistic portrait of Euthydemus.

under the Diodotoi and had been adhered to at the start of Euthydemus' own reign is unclear. Since the portraits have such clear individual and naturalistic features it must be assumed that they were accurate depictions of each king. Therefore they may have implications for the immediate users of the coins, suggesting that they would have been people familiar with the king's appearance, perhaps members of the royal household, or soldiers. This is the first example of a feature of the iconography of these coins which will reoccur throughout this study: the use of standard Hellenistic approaches with a slight modification that often results in a considerable change in character.

One of the main ways in which Euthydemus' copious coinage has been used in historical reconstructions of the period is to suggest a long reign for the king since he seems to age significantly on his coins. All the coins of the aged group share this very realistic style, and were probably produced by the same engraver, or at least by engravers working closely together. When using these coins for historical conclusions it must always be remembered that the phenomenon that seems to be an ageing sequence across Euthydemus' coins may actually just be a number of different styles and engravers at work, and therefore that, although one particular portrait type may be considered to be realistic, the length of the king's reign cannot be securely based on his portrayal on these coins.

Demetrius I

The obverse type showing the king that appears on the coins of Demetrius I is much more consistent than that of his predecessor (**fig. 10**). The most distinctive feature is the addition of the elephant scalp. For the first time in Bactrian coinage the king is also shown from the shoulder up, rather than just in the traditional head view. Once more the diadem is highlighted, with the two ties shown behind the king's neck, and continuing onto the king's head, with the front of the band disappearing beneath the elephant's trunk and tusk. The type is strongly reminiscent of Ptolemy I's issues showing Alexander wearing the elephant scalp, apparently in recognition of the latter's conquest of India. It has recently been suggested that the inclusion of this attribute was also a reference on the part of

Ptolemy to elephant hunts undertaken by much earlier Egyptian pharaohs.[132] Is it possible that the elephant scalp also had a local interpretation in Bactria?

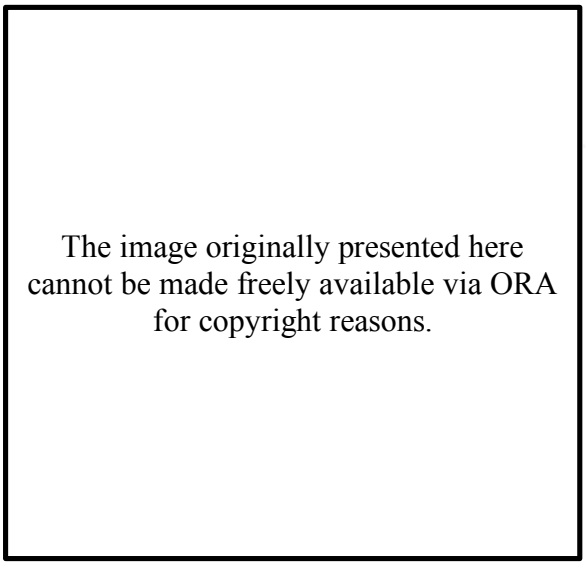


Figure 10: Obv. tetradrachm of Demetrius I (BM 1870.0701.1)

The elephant scalp may have been used in a similar way to that on the coins of Ptolemy by symbolising an Indian conquest of Demetrius' own, and has been used to great extent in attempts at historical reconstruction.[133] The appearance of the scalp on the coins from Bactria is, however, rather different from that on the Ptolemaic issues. In Egypt the type was clearly a development of Alexander's Heracles type in which a lion scalp was worn by the bust on the obverse. The shape of the animal's head strongly mirrored the appearance of its well-known predecessor with the pelt covering the entire head of the figure as well as running down the back and side of the head. It is clear on these coins that, however absurd, a real elephant scalp was being envisaged by the engraver. The portrait of Demetrius is quite different. Here there is a very definite line running around the side of the king's head and tucked behind his ear. It is likely that this line is intended to represent the diadem since another line runs parallel to it for much of its course. The scalp, however, does not come below this line, giving it a very definite end point. For this reason the headdress represented here is most likely a helmet of some kind rather than an elephant scalp. Such a portrait raises the

[132] Lorber (2012).
[133] See, for example, Bernard (2005), 21. The reference to a Demetrius *rex Indorum* in Justin (41.6) gives seemingly strong support to this assumption.

possibility that the helmet was a real object worn by the king, a feature not incongruous to the behaviour of other Hellenistic kings.

Whatever the reasoning behind Demetrius' adoption of the elephant scalp, it was certainly an extraordinary departure for the types of Graeco-Bactrian coinage, being the first time that a king had been depicted with any sort of attribute, while choosing one with which only Alexander had been previously shown can be seen as a very bold move.[134] Elephants, as we shall see later, were also a significant part of Seleucid iconography as well as holding a major place in Indian religion. Copper triple unit coins issued under Demetrius feature an elephant head on the obverse. The animal has a bell around its neck, indicating that it was trained and able to be ridden and otherwise controlled. A primary use of such elephants would have been a military one.[135] Any specific meaning of the elephant scalp is not, therefore, necessary, the reference may simply have been to Demetrius' military power.

Euthydemus II

The obverse portrait of Euthydemus II is quite different from that of Demetrius (**fig. 11**), since the king is shown wearing only the diadem with no further attributes. He looks boyish on the coins, with no visible signs of ageing, a far cry from the aged portraits of Euthydemus I. Interpretation of the type has even been taken so far as to suggest that it shows an 'un-Greek face' with the implication therefore being that Euthydemus II's mother was a member of the Iranian nobility.[136] Such an approach is, of course, highly dubious. As on the coins of Demetrius the king is shown from the shoulder up, allowing his clothing to be included in the type. The tetradrachms and drachms of Euthydemus II were also produced in higher relief than previous issues. As can be seen clearly below there is a significant gap where the type ends below the king's shoulder. It is unclear why such a high relief was used in the production of these coins, and how this was done while still producing a high

[134] Although a potential connection of the elephant scalp to Dionysus has been suggested (Smith (1988), 41), such a reference here seems unlikely given the very few representations of that god we find in the material culture of the Graeco-Bactrian kingdom (see below).
[135] Elephants were a valuable weapon elsewhere in the Hellenistic world and Seleucus I had conceded his Indian territory in exchange for five hundred beasts in 303 (Strabo 15.2.9). Only two years later they showed their value by playing a decisive role at the Battle of Ipsus.
[136] Davis and Kraay (1973), 245.

quality of coin, without any form of 'ghosting' of the obverse type on the reverse as would usually be associated with a high relief of this sort.

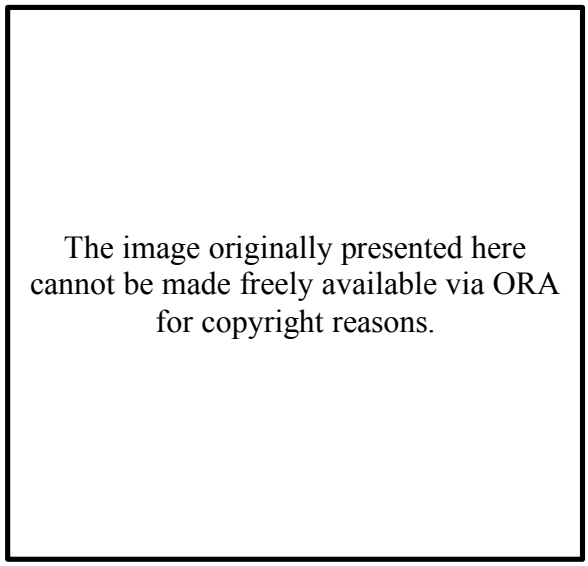


Figure 11: Obv. tetradrachm of Euthydemus II (BM 1888.1208.98)

Pantaleon & Agathocles

Unlike those of their predecessors, the coins of Pantaleon and Agathocles are similar in appearance (**figs 12 and 13**). The diadem ties, hair, and facial features share many peculiarities. This similarity, along with the small number of coins of Pantaleon, has been used to suggest that Agathocles and Pantaleon reigned contemporaneously and that Pantaleon's reign was particularly short. As seen in the above table, the suggestion of a close relationship between the two kings seems to be supported by the very similar types they employ on all their coins. Whether the output of Pantaleon's coinage was small will become clear below when the number of dies used to produce the coinage is estimated. The portrait of Agathocles is similar to that of Pantaleon. The portrayal of the king's hair, along with the pointed nose and chin is almost identical. Both diadem ties now flutter behind the neck and the folds of the garment, which are gathered at the shoulder in both types are nearly indistinguishable. Once again it is very important for the historical reconstruction of the period to decide whether this similarity represents a genetic relationship between the kings, or whether the mint personnel remained unchanged during the two reigns, or even that previous dies or coins were copied by the engravers for different kings. The latter option is to be preferred.

Figure 13: Obv. tetradrachm of Pantaleon, 15.79g (Ashmolean, Hollis Collection).

The image originally presented here cannot be made freely available via ORA for copyright reasons.

Figure 13: Obv. tetradrachm of Agathocles (BM 1924.1017.1).

Antimachus I

Figure 14: Obv. tetradrachm of Antimachus I, 16.33g (Ashmolean, H. de S. Shortt Bequest).

Under Antimachus an item of headgear reappears as a consistent feature of the royal portrait. The king is shown wearing the *kausia*, the ties of the diadem fall straight down behind his neck, and he seems to smile (**fig. 14**). The choice of realistic headgear is highly unusual in Hellenistic coinage as a whole and foreshadows the appearance of the Boeotian cavalry helmet on the coins of Eucratides and later Indo-Greek kings. The precise origin of the *kausia* is unclear and has been the subject of an impassioned debate.[137] It was first suggested that the *kausia* was an item of headgear with an Indian origin by Bonnie Kingsley.[138] She claimed there was no archaeological or literary evidence of the *kausia* in the West before Alexander the Great, that a passage in Diodorus suggested that the Macedonians had adopted Indian clothing, and that the *chitrali*, a hat worn in modern Afghanistan and Pakistan, and apparently similar to the *kausia*, was an indication of its Indian origin. There is, however, much evidence, both literary and archaeological, to suggest that the *kausia* had been in use in Macedonia before Alexander.[139] Perhaps most famously the hat is worn by the guards in paintings on

[137] Even the material of the hat is uncertain, with leather and metal preferred by some scholars, although felt seems to be the most commonly accepted suggestion. For a full discussion see Saatsoglou-Paliadeli (1993).
[138] See Kingsley (1981) and a further defense of her thesis in Kingsley (1991).
[139] Dintsis (1986), 183-195; Fredricksmeyer (1994).

the Vergina royal tombs as well as by a now mostly obliterated figure in the Alexander mosaic. Kingsley's association of the *kausia* with the *chitrali* was based mainly on the claim that the former shared the latter's distinguishing feature of a band of wool above the eyes. Such an attribute is often difficult to make out on many of the Macedonian and Hellenistic depictions of the *kausia*. In fact Kingsley herself was forced to concede that 'the design of the cap…changed in the West, the roll diminishing before it disappeared'.[140] Any passing similarity to the *chitrali* is surely one of accident, although the hat seems to have gained particular popularity in the East in the later Hellenistic period.[141]

The most interesting feature of the hat that appears on the coins of Antimachus is just how it differs from other depictions of the *kausia*. The brim is noticeably different, coming to a very definite point some way in front of the face. On the Vergina tomb paintings no point is recognisable and the brim, if there even is one, is much shorter. The different angle, of course, makes comparisons difficult since very few depictions share the profile view of the numismatic portrait.[142]

If Antimachus' hat is a *kausia*, as seems likely, the iconography is fully Macedonian with no potential local interpretation. The depiction of the diadem is as clear on these coins as on those of Antimachus' predecessors. The portraits of the Graeco-Bactrian kings were designed to highlight one feature above all others: kingship. After all, this was a highly important feature of any Hellenistic kingdom. In order to be accepted as coins the obverse image had to be a bust of the king with attributes indicating his power, the authority through which the coin would circulate trusted and unchallenged. The diadem was the main indicator of this power, but further attributes were sometimes added to reinforce it. The elephant helmet of Demetrius, perhaps indicating conquest of a specific region, but more likely the military prowess of his army, while the *kausia* suggested a link to the Macedonians whose own conquests had fully established a Greek presence in Bactria.

[140] Kingsley (1991), 63.
[141] Plantzos (1997), 204.
[142] The bronze head wearing a *kausia* found in the sea near Kalymnos offers the potential for comparison, but I have been unable to find an image of it taken in profile. The male figure wears a short beard and a headband under the hat. Ma (2013), 270 points out that such an image 'does not fit any of the known "types" of royal portraiture, and could represent a Hellenistic ruler in a particular role…'

The expression worn by Antimachus on some of the coin portraits has also been used in the construction of historical narratives, and in particular in attempts to define the king's character. Tarn saw in Antimachus' slightly smiling face 'no sense of overweening pride', instead preferring to think 'he is rather amused at himself'.[143] In a similar way Newell saw 'a person full of humor and bonhomie'.[144] Such a feature appears on a particular portrait type of the Roman emperor Licinius and is also to be found on some coins of Julius Caesar and Mark Antony.[145] Smith has suggested that this is 'the smile of the commander who is a hardened fighter but affable and accessible to his men'.[146] Antimachus' expression, of course, predates the Roman examples, but such an explanation is attractive, particularly when taken with the choice of the *kausia*, which was not an exclusively regal item of headgear. It is likely that the interesting developments of this portrait type were once again designed to send a message to the initial recipients of the coins, soldiers.

[143] Tarn (1951), 92.
[144] Newell (1937), 67.
[145] Smith (1997), 193.
[146] *ibid*. The appearance of a different facial expression on coins was not without danger and was in a certain case misinterpreted as a particular sort of straining on the emperor Vespasian's part (Suetonius *Vespasian*, 20).

Reverse Types

Table 3: Reverse deities by king.

	Euthydemus I	Demetrius	Euthydemus II	Pantaleon	Agathocles	Antimachus
Heracles	●	●	●			
Apollo			●◆			
Artemis		●				
Zeus				●	●	◆
Hecate					●	
Dionysus				●◆	●◆	
Poseidon		◆				●
Hermes		◆				
Athena		◆				
Nike						●
Oriental female deity				●	●	

● - deity appears on coinage

◆ - attribute of deity appears on coinage

Table 3 shows the different gods that are depicted on the reverses of these coins, as well as attributes, which strongly suggest a particular deity (for example a *caduceus* on a bronze coin of Demetrius is a reference to Hermes). There is a clear division between the first three kings and the last three. Euthydemus, Demetrius, and Euthydemus II all make use of Heracles on their coins, with the additional appearance of a number of attributes of different deities under Demetrius. Under Pantaleon, Agathocles, and Antimachus, Heracles is completely omitted with a preference for Zeus instead. The use of different reverse types has been very important for a number of the historical reconstructions of the period and can be reduced to three different interpretations: dynastic, local, and factual.[147] A dynastic interpretation involves the assumption that a particular dynasty identified itself through the use of a particular type. The identification of what is effectively taken as a 'coat of arms' of some sort is seemingly arbitrary and the reasoning behind it is unclear.

[147] Guillaume (1990), 78.

The types that appear on the coinage of Demetrius are also interesting because of the sudden increase in deities and attributes. Under Euthydemus I only Heracles and a horse had appeared on the bronze coinage, while Heracles and Artemis appeared themselves on Demetrius' coinage along with the attributes of Hermes, Poseidon, and Athena (caduceus, trident, and gorgon shield). This increase may have little to do with any sort of iconographic programme, rather it was simply a way of distinguishing the new triple and sextuple bronze units that were introduced under that king. Until Demetrius the largest bronze coin produced in the Graeco-Bactrian kingdom had been the double unit. The two larger denominations were new and, although clearly larger than the smaller units, needed obviously different types as distinguishing features. The elephant head that appears on the triple unit and the gorgon shield and trident on the sextuple fulfil this purpose well with their novel iconography.

The shared use of Heracles on the coins of the first three kings has led to the suggestion that this was the dynastic type of what was presumably the Euthydemid dynasty.[148] The difference between a seated Heracles on the coins of Euthydemus and a standing figure on those of Demetrius I and Euthydemus II has even been connected to contemporary events and also to future plans the king may have held.

> Euthydemus' regular type was Heracles seated on a rock, resting after his labours; doubtless it was settled after Antiochus III retired, and meant that Euthydemus had made of Bactria an important kingdom. But Demetrius' regular type was Heracles standing and crowning himself; the new king envisaged fresh labours and conquests, and may even have thought from the start of invading India just as Alexander had of invading Persia.[149]

The use of Heracles on the coins of these three kings is certainly striking, although it does not necessarily have to suggest any sort of dynasty. Recent epigraphic evidence has confirmed that Demetrius was the son of Euthydemus I, but Euthydemus II's relationship (if any) to other kings is still uncertain.[150] Coin designs were often very conservative in nature. Any dramatic change would cause uncertainty among the users of the coin, who were not necessarily interested in any potential statement

[148] Narain (1957), 59.
[149] Tarn (1951), 93.
[150] Bernard, Pinault, and Rougemont (2004).

made by the type, rather that the type was one they recognised, and that therefore they were able to trust the value of the coin. Although the portrait of the king on the obverse had changed, the appearance of Heracles on the reverse may have helped to reassure those using the coins that they were still of good silver and guaranteed by the state.

Reverse types have also been used as evidence in historical narratives by suggesting that a particular deity may have had a link to a certain city (the local interpretation), and that therefore the coins were minted in that city. For our six kings this approach is used twice by Tarn, both times with reference to the coins of Agathocles and Pantaleon. The silver tetradrachms of these two kings that feature Zeus holding Hecate on the reverse are said to have been minted in Alexandria-Kapisa purely on the basis that 'Zeus is the elephant-god of Kapisa'.[151] Likewise the cupro-nickel coins minted under Agathocles and Pantaleon, which feature the 'panther of Dionysus' on the reverse are attributed to a mint at Nagarahara near Jalalabad, which is said to have had 'some especial way to the worship of Dionysus'.[152] Such attributions are obviously highly problematic, particularly with such scant evidence.

The final use of the reverse types has come through attempts at a factual reconstruction of events based on a supposed symbolic meaning of the type. As we have already seen the seated Heracles on the coins of Euthydemus has been said to symbolise a king tired after his labours, while the standing Heracles of Demetrius I and Euthydemus II suggests a renewed vigour.[153] The trident on the reverse of Demetrius' bronze coins may suggest that the king actually had a fleet of ships, which since the coin was a Bactrian issue, must have been stationed on the Oxus.[154] The Poseidon on the coins of Antimachus is said either to suggest a naval victory or that the king held territory that was famous for the horses it produced, which was perhaps a similar reason as that for the inclusion of a horse on the bronze coins of Euthydemus I.[155] Once again it is very difficult to support these conclusions and they should be discarded. An approach that is more helpful is one that looks to compare influences of the coin types in an attempt to search for iconographic connections.

[151] Tarn (1951), 157.
[152] Tarn (1951), 159.
[153] This interpretation is also given by Narain (1957), 23.
[154] Tarn (1951), 142-143.
[155] Tarn (1951), 90-91; Narain (1957), 49.

Recently this was the method employed by Rachel Mairs who found evidence of a process of transmission of artistic style and subjects from the Mediterranean to Bactria and Northern India.[156] Coins were notably missing from this study and they are a patently different category of evidence. Unlike the moulds whose motifs Mairs was able to trace so successfully, coin dies, for reasons of security, would not have travelled. Unlike other categories of artifacts it was also very important that the design of a coin was recognisable and familiar to those who used it. Without this familiarity the trust, which was essential for a coin to fulfil its main purpose and be accepted without the need for further weighing or testing of the metal, would have been missing. Nevertheless the phenomenon of shared imagery can provide some insight into the context of the production of the coins.

The various deities that appear on the coins are dealt with in detail below.

Heracles

Heracles seems to have been a particularly popular deity in the east of the Hellenistic world. Literary sources suggest evidence of an Indian cult that assimilated Heracles with local deities and Indian peoples considered by the Greeks to be descendants of the hero who was thought to have travelled in the region.[157] He was also strongly linked to Alexander, not only through the Macedonian claim of descent from the hero, but also from his extensive output of tetradrachms, with the head of Heracles wearing a lion scalp on the obverse. This type was copied and appeared on Seleucid coins as well as local imitations long after Alexander's death.[158] Heracles was also the god, along with Hermes, to whom a dedicatory inscription was found in the gymnasium at Aï Khanum.[159]

A coin type similar to the seated Heracles on Euthydemus I's silver and gold coins appears on a number of coins of Antiochus I and II (**fig. 15**).[160] The depictions of the hero are remarkably alike. He is seated on a rock, his left leg firmly planted in front

[156] Mairs (2014). See also Wood (2012) for a treatment of the subject, and a similar approach, across a longer period of time.
[157] Diodorus II.39.1-4; Strabo 15.1.8.
[158] Abdullaev (2007), 539-541.
[159] Robert (1968), 417-421.
[160] Antiochus I: *Seleucid Coins* 313, 318. Antiochus II: *Seleucid Coins* 497, 500, 501, 503-505, 509-512, 516.

of his right, while he leans back on his left arm, holding his club in his right. Such a similar type, has, of course, attracted the interest of numismatists and historians. The matter is complicated by a lack of certainty of the location of the mint at which these particular coins of Antiochus I and II were produced.

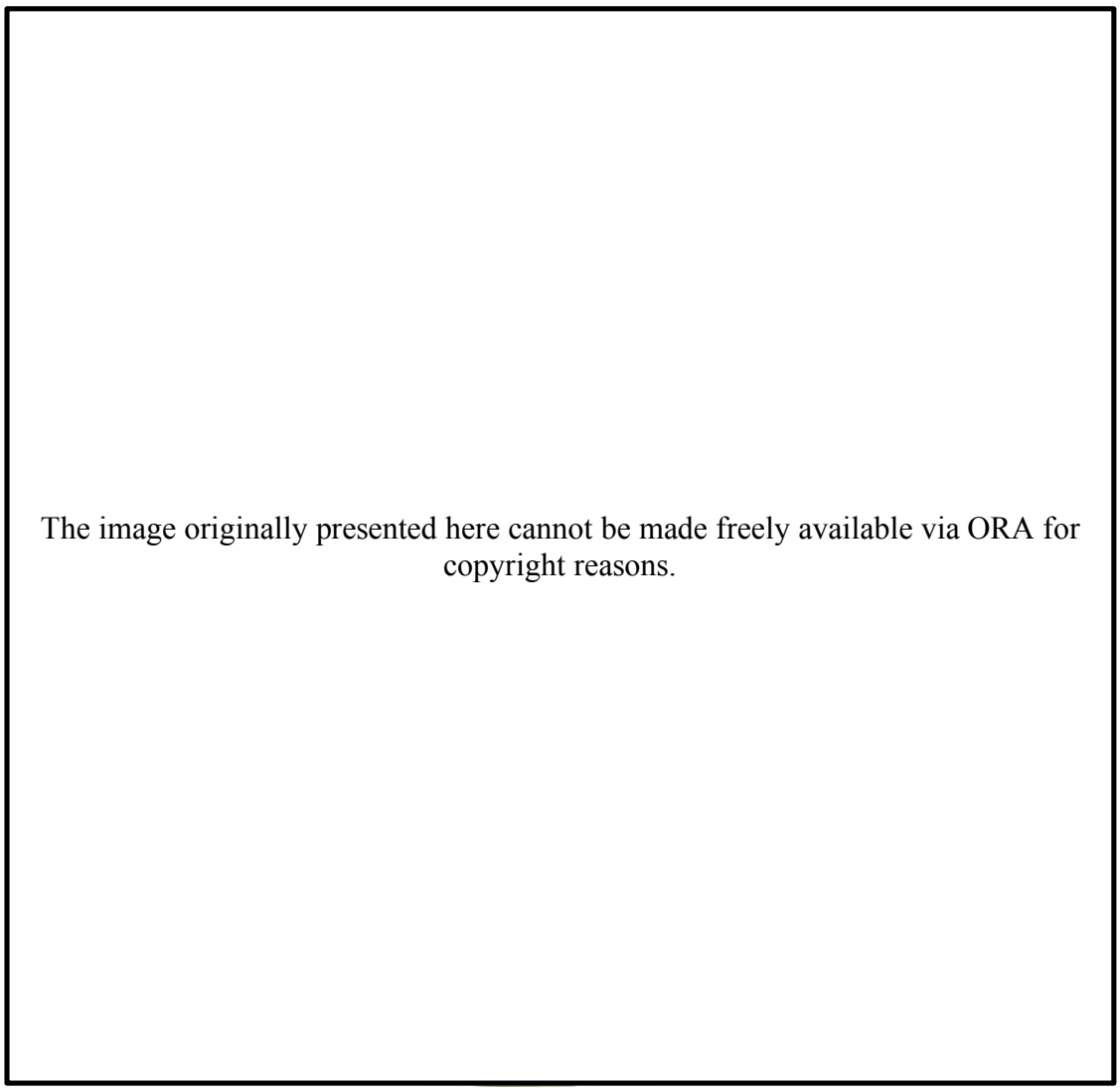


Figure 15: Top: Tetradrachm of Antiochus II minted at Phocaea (?) (Freeman and Sear Mail Bid Auction 11, 148). Bottom: Tetradrachm of Euthydemus I (BM 1856.1105.2).

One of the few pieces of evidence available to us about the life of Euthydemus I comes from Polybius (XI, 34, 1). We are told that Euthydemus was 'a Magnesian'. Unfortunately no further details are provided and it is uncertain whether Polybius was referring to Magnesia on the Meander or Magnesia near Mount Sipylus. Although the precise mint of the coins of Antiochus I and II with the Heracles reverse is uncertain, the possible cities (Smyrna, Myrina, Cyme, and Phocaea) are all to be found in western Asia Minor, near either Magnesia and the exact location is not important here.

Bernard assumed that the Magnesian who originally emigrated to Bactria was actually Euthydemus' father, since the rise of the Parthian state would have caused difficulty for traversing that region in the middle of the third century, when Euthydemus is thought to have been in his youth.[161] Such an interpretation seems cumbersome, and directly contradicts the evidence of Polybius. Euthydemus himself may have emigrated to Bactria and it is possible that, for whatever reason, he decided to reuse a coin type with which he had been familiar in his youth on his own issues. We must be careful not to push the evidence too far, but at the very least, it seems likely that the similarity between these two types is something more than a coincidence, and was an attempt by Euthydemus to recognise his background in Asia Minor.

As we have seen already the depiction of Heracles on the coins of Euthydemus' son, Demetrius, is different. The hero is now shown standing, facing and crowning himself with a wreath in his right hand, while his club and lion skin rest in the crook of his left arm. Such a type is not mirrored on earlier coinage from the Greek world, but a very similar type does appear on a number of Roman coins produced under Marcus Aurelius, Lucius Verus, and Commodus.[162] Vermeule suggested that the coin imagery was taken from a well-known statue type in the Hellenistic world that may have originated in the fourth century with similarly composed athletic statues. 'Whoever designed the dies for states as remote as Baktria could have reproduced a local work of art, but more likely copied a work in a more renowned locale. The Baktrian Herakles Crowning Himself was probably derived, through several possible methods of transmittal, from a statue located in some spot closer to the centre of the Hellenic world'.[163] It seems odd that a well-known type from elsewhere in the Greek world would only find its way onto coins in Bactria.

In fact Vermeule's view can now be challenged with the appearance of a number of bronze statuettes from Central Asia which show Heracles crowning himself. The first example was found during the excavations at Aï Khanum and shows a representation very similar to that on the coins with the omission of the lion skin.[164]

[161] Bernard (1985), 131.
[162] Vermeule (1957).
[163] Vermeule (1957), 290.
[164] Bernard (1974), 302.

The image originally presented here cannot be made freely available via ORA for copyright reasons.

Figure 16: Top: Rev. tetradrachm of Demetrius I, 16.02g (Ashmolean, Hollis Collection). Bottom: Bronze statuette of Heracles found at Aï Khanum (Bernard (1974), 303, fig. 13).

In recent years a number of further examples of similar bronze statuettes of Heracles have also appeared, seemingly from clandestine excavations.[165] Another bronze with a similar composition is also held in the Ashmolean Museum, although

[165] Abdullaev (2007), 550-553.

this example may have a later date.[166] Although this particular motif of Heracles, then, was one that did not appear on other Hellenistic coins it was to be found in the material culture of Bactria, suggesting that a Mediterranean model, although perhaps the initial source, was unlikely to have been the immediate prototype for the reverse type of Demetrius and later Euthydemus II.

Zeus

Figure 17: Reverse of Pantaleon tetradrachm, 15.79g (Ashmolean, Hollis Collection).

The initial appearance of Zeus on the coins in this study is the reverse type of the silver coinage of Pantaleon (**fig. 17**). Perhaps surprisingly representations of Zeus on media other than coins from the Hellenistic far east are limited.[167] His numismatic presence, however, was considerable. He appears on the earliest coins of the Graeco-Bactrian kingdom struck under Diodotus, where he also had a semi-canting function in relation to the king's name,[168] all the way through to coins of the Indo-Scythian kings Maues and Azes in the first century BC.[169] The first portrayal of Zeus to have reached this region on coins was that which appeared on the reverses of Alexander's tetradrachms (**fig. 18**).

[166] Ashmolean EA1994.57. See also the statuettes in Errington and Cribb (1992), 99-102.
[167] Stančo (2012), 199-211.
[168] MacDowall (2007), 239.
[169] Errington and Cribb (1992), 75, no. 58 (BM 1894.5.6.501).

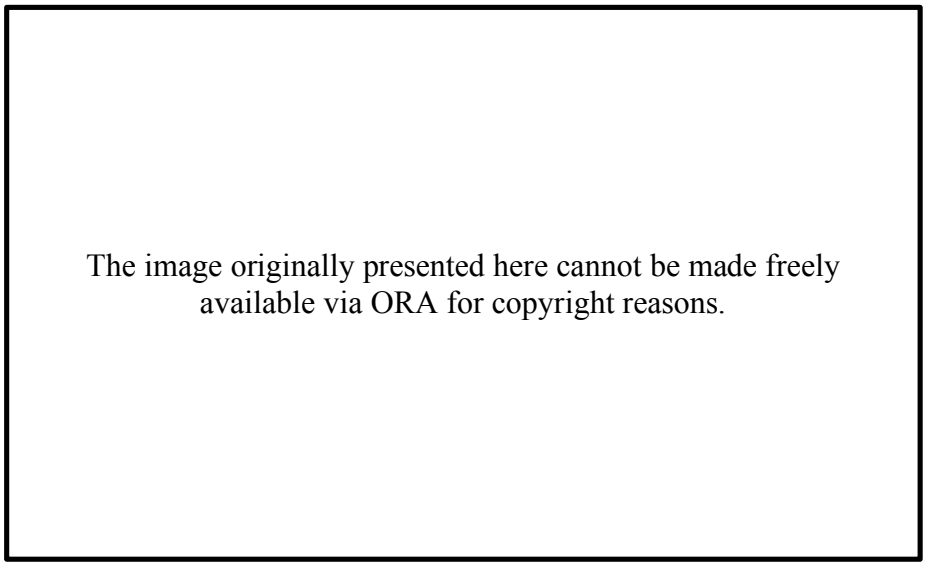


Figure 18: Tetradrachm of Alexander the Great, Babylon mint (325-323 BC), 17.18g (ANS 1965.77.128).

Much like the obverse Heracles it has been suggested that the reverse image of Zeus was identifiable to users in the East as being akin to their local supreme god.[170] The image was also a very widespread one thanks to the huge production of posthumous Alexander coinage, many examples of which were found in Central Asia.[171] The two depictions of the god, that on Alexander's coins and the one that appears on Pantaleon's reverses, are close in composition. In both Zeus is seated on his throne, which is shown with only two legs visible, but an attempt at perspective is also made by showing the upright portion behind the god's back. The large sceptre is also present in both images. The main difference between the two is the figure held in Zeus' outstretched right hand. On the coins of Alexander this position is taken by an eagle, while the Pantaleon reverse features Hecate her arms outstretched holding two torches. A composition of this sort is also present on the tetradrachms of Lysimachus, although here the seated figure is Athena and it is Nike held in her hand crowning the first letter of the ruler's name.[172]

A different version of this image is to be found on the silver coinage of Agathocles. Zeus is now shown as standing, although still holding the sceptre in his left hand and Hecate in his outstretched palm. The appearance of Hecate is something of a surprise as she is not regularly found on coinage. It is likely that the representation

[170] Mørkholm (1991), 43; Troxell (1997), 87-89.
[171] Mitchiner (1975), vol. 1, 11-12; Abdullaev (2007), 541.
[172] Mørkholm (1991), 81.

of her on Pantaleon's and Agathocles' coins is actually that of a cult statue since there may be a solid base at the bottom of her legs and Hecate is carried by Zeus. Such a depiction may have had a physical equivalent in Bactria that would have been familiar to the users of the coins, but such a link is impossible to prove on the current evidence. The reuse of other Hellenistic imagery, but with a somewhat unexpected variation (a seated Zeus with a miniature Hecate) is the beginning of a pattern that leads to the syncretism of later Indo-Greek iconography with the appearance of elephants in the depiction of Zeus on the coinage of Antialcidas.[173]

Although Zeus is not well represented in the material culture of Hellenistic Bactria there is one particular item that has been the subject of much debate: the famous marble fragment of a sandaled foot cut in a naturalistic Hellenistic style and found in the Temple with Indented Niches at Aï Khanum.[174] The context of the item's discovery, next to a collapsed podium, and at the centre of the back wall of the temple's *cella*, suggests that it was once part of a cult statue. The straight and deliberate cut at the back of the foot indicates that the figure was an acrolithic one. Identification of the deity is, of course, challenging with such a small portion of the whole object. The sandal on the foot does have a thunderbolt motif, leading to an apparent association with Zeus.[175] Although the influence of Alexander's reverse type is probably the strongest on the coin design of Pantaleon and Agathocles, the existence of a cult statue of Zeus may have given the appearance of that god added resonance with users of the coins.

Dionysus

Much like Heracles, Dionysus had a strong association with the east, at least from a Mediterranean Greek point of view.[176] Despite this there is no architectural evidence of a cult of Dionysus in the east.[177] There are, however, many depictions of the god in different media none of which resemble the single appearance of Dionysus on

[173] *SNG* ANS 1056-1103.
[174] Bernard (1969), 329.
[175] Bernard (1969); Shenkar (2011).
[176] See, for example, Diodorus II. 38 and Strabo XV. 1, 7-10. Chaudhary (1983) makes an attempt to suggest an Indian assimilation of Dionysus and Balarama on the basis of ancient literary evidence. Any such identification should be treated with caution.
[177] Stančo (2012), 86.

the cupro-nickel and bronze coins of Pantaleon and Agathocles.[178] On the coins a bust of the god wearing an ivy wreath and *mitra* is shown with a *thyrsus* over his left shoulder. The reverse type of a panther and vine is also clearly linked to the obverse design (**fig. 19**).

Figure 19: Cupro-nickel double unit of Agathocles, 8.02 g (Ashmolean, Hollis Collection).

This is the only appearance of Dionysus on coins of the Graeco-Bactrian kingdom. The engraving of the reverse type is particularly unusual in the way that it shows the head of the panther in a three quarter view. Once more the pose of the reverse type, with one paw raised, is also known from a bronze found in the Mediterranean and now held at the Musée des antiquités nationales at Saint-Germain.[179]

Apollo

The bust of Dionysus on the bronze and cupro-nickel coins of Pantaleon and Agathocles owes much to the very similar portrayal of Apollo on coins of the same metals minted under Euthydemus II. The god appears with a very similar arrangement of his hair with two or three long strands running underneath the wreath (whether it be of laurel or vine leaves) and down the neck. As we shall see later there are other very close similarities between these coinages, not least their unique use of the cupro-nickel alloy.

[178] Abdullaev (2005).
[179] Widemann (2009), 497.

Unlike Zeus, Apollo had a very strong presence on earlier Seleucid coinage.[180] In some ways it is perhaps unsurprising to find only a very limited portrayal of the god on Graeco-Bactrian coinage, which was able to function without the appropriation of types from the previous rulers of the area. The choice of kings who appear on the 'pedigree' coinage of Agathocles is clear evidence that, although happy to include Alexander and his types, the Seleucids were omitted from Bactrian coin design, Agathocles preferring to include only earlier Graeco-Bactrian kings on that series.

Artemis

Like Apollo, Artemis only appears on a single issue of one king in this study, the reverses of the bronze double units of Demetrius I. She had been shown on the reverses of certain bronzes of the Diodotoi (*BNBact* séries 8-11), and was to reappear much later on silver Indian standard drachms of Artemidorus (*BNBact* séries 1-4). She is known from very few non-numismatic depictions in the area, the majority probably later than the first century BC, and does not seem to have influenced depictions of local deities.[181] As we have already seen her appearance on Demetrius' coins may have more to do with indicating different denominations, perhaps with an attempt at creating continuity from the earlier issues of the Diodotoi, than any iconographic programme.

[180] Iossif (2011), 245.
[181] Stančo (2012), 41-44.

Poseidon

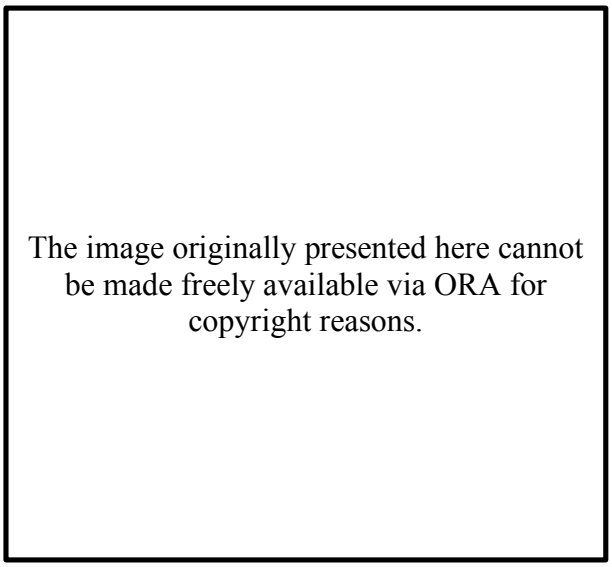


Figure 20: Rev. tetradrachm of Antimachus I (BM 1888.1208.124).

The importance in historical reconstruction of the use of Poseidon for the reverse type of Antimachus has been discussed above, but the meaning behind its use is uncertain. The choice of a primarily maritime deity is a difficult one to explain in land-locked Bactria, leading to the connection with Poseidon's other well-known association: that with horses, and even, more recently, earthquakes.[182] The Amu Darya (Oxus) river is, however, a very large feature and flows ultimately into the Aral Sea, perhaps providing a large body of water as explanation for the choice of Poseidon. Other than the appearance of a trident on the bronze coins of Demetrius, nothing relating to Poseidon is attested on Graeco-Bactrian coins before this. The appearance of Poseidon on early Seleucid coins is very rare; he is not represented on any silver issues, and he is shown only as a bust on two different series of bronze coins minted under Seleucus II and Antiochus III.[183]

For our purposes it is the pose taken by Poseidon that is most interesting. He is consistently shown on all the silver coins of Antimachus with his hips tilted slightly to one side with his weight firmly placed on his right foot with his left trailing behind. The trident is held with a distinct raised grip. Such a pose is very familiar from Hellenistic sculpture and both have been suggested recently to be particularly

[182] MacDowall (2007), 240.
[183] *Seleucid Coins* 738, 1149-1150.

dominant poses.[184] The closest comparison is the Poseidon of Melos in the National Archaeological Museum in Athens, the only difference being the inclusion of the palm in the reverse type of Antimachus, although the attribute is not extant on the statue. Once more we find a very close iconographic connection between the coin types and statuary.

Elephants

Although obviously not a direct link to a deity under the Graeco-Bactrian kings, elephants are a common theme on their coin types. Elephants, and even simple elephant heads were common on bronze coins (see for example *Seleucid Coins* 1272-1277) as well as in other areas of iconography under the Seleucids.[185] Under Demetrius not only does the king wear an elephant scalp helmet, but the bronze triple unit coins feature an elephant's head on the obverse (**fig. 21**). The elephant wears a bell and is therefore presumably domesticated, perhaps with a military purpose.

Figure 21: Bronze triple unit of Demetrius I, 13.96g (Ashmolean, Oman 1947).

Elephants also appear on some non-Greek standard issues of Antimachus, although here the whole body is shown with the animal walking either left or right. The reverse of these coins is a thunderbolt and this may be the first stage of the iconographic connection between Zeus and elephants that was developed under the Indo-Greeks. Whatever the case here, it is possible that the elephant has taken on a

[184] Masséglia (2015), 23-26, 28-32.
[185] Kosmin (2014), 3.

role that was something more than its earlier indication of military power and we may see these types as the precursors of later religious uses of elephants.

Conclusion

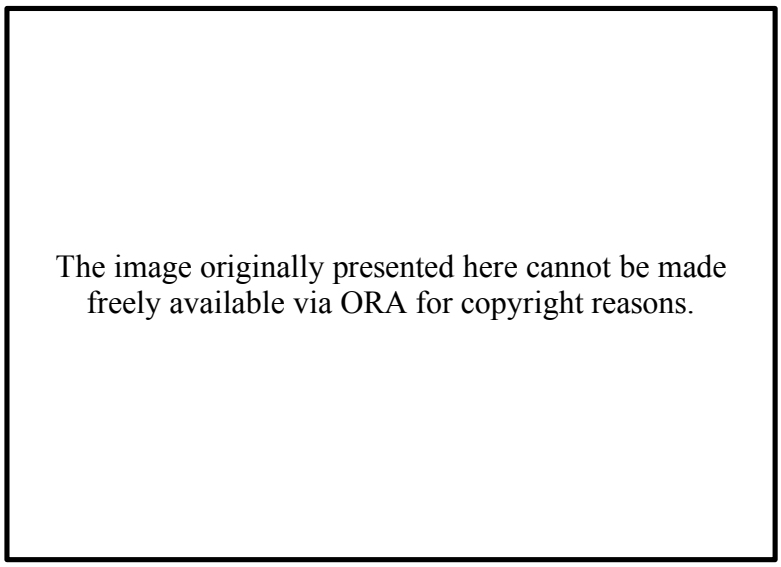
The repeated connections to statue and statuette types are in many ways unsurprising and probably have a banal explanation; there are numerous examples of Classical and contemporary statues represented on coins elsewhere in the Hellenistic world.[186] When a coin type was initially selected to be the design that appeared on the reverse of a particular king's coins a prototype of this image was presumably disseminated to the mint or mints. The medium for this prototype is, of course, unknown, but the repeated statuary connection may indicate that it was a three dimensional one. The consistency of the portrayal of Poseidon's stance on the coins of Antimachus, for example, indicates that there was a single image from which the die engravers worked; they had not simply been given an instruction to produce an image of Poseidon holding a palm, they were all looking at the same image, which, given the 'Hellenistic swagger' was probably a statue or statuette. A lack of such artifacts from Bactria does not eliminate this possibility, and the many bronze statuettes from the region which show Heracles crowning himself are further evidence to support this idea of a three dimensional prototype. The consistency of the depiction, even on dies of very different styles, certainly indicates that the types were designed centrally and then disseminated to the production areas.

Non-Greek iconography

The phenomenon of syncretism has received a lot of scholarly attention in recent years and much effort has been taken up in identifying 'Greek' and 'non-Greek' aspects of iconography.[187] Such an approach can bear fruit, but is particularly ineffective when applied to numismatic imagery. As already stated the choice of iconography for coins is one which involves a balance between authority and tradition.[188] On the one hand the coins have to be accepted as just that, coins, and as such have to conform to their users' idea of coinage, while on the other the issuing

[186] Ashmole (1936); Lacroix (1949); Mørkholm (1991), 26-27.
[187] See, for example, the treatment of Boardman (1994).
[188] Cribb (2009), 498.

authority that guarantees that the coin is of the correct weight and of good metal also has to be identifiable. As such coin design was, and still is extremely conservative, a phenomenon demonstrated in the ancient Greek world by the long production of Athenian 'owls' and posthumous Alexanders, both of which had a widely known level of trust and familiarity with the types. The dramatic appearances of very different coin types under Agathocles and Pantaleon is therefore all the more interesting and suggests a different group of intended users of these coins.



Unlike Greek, Attic weight coins that had been introduced to the region by Alexander and continued under the Seleucids and Graeco-Bactrian kings, Indian coins had, from their very beginning, been made from pieces of silver cut into irregular, often roughly rectangular shapes and then struck with several punches of different designs.[189] Such a concept was clearly very different from the Greek idea of coinage with its divine types and legend indicating the king, or another issuing authority. Under Pantaleon and Agathocles different parts of this tradition seem to have been appropriated by the Graeco-Bactrian kings. They produced bronze coins with a Greek legend on one side and a Brahmi or Kharosthi inscription on the other. Unlike almost all Attic standard coins these issues had no monogram on either side, while they were cut from sheets of metal instead of the usual technique of casting individual blanks. In much the same way that the legend was aimed at two different audiences the iconography of these bronze issues was also of a mixed nature.

[189] Bopearachchi and Pieper (1998). The date of the introduction of the punch-marked coinage is controversial, but it was certainly long-established by the early second century BC.

Figure 23: Bronze coin of Agathocles, 11.47g (Ashmolean, Hollis Collection).

On the side with the Greek legend the type is of a lion or panther, an animal familiar from the bronze and cupro-nickel coins of the same kings. The side with the Indian legend, however, shows a female figure holding a flower and perhaps executing a dancing movement of some sort.[190] Such an image has no clear interpretation in a purely Greek iconographic context. The figure has been associated with a variety of Indian deities, and a single definitive interpretation is not possible.[191] One persistent conclusion based on these coins has been to link Agathocles and Pantaleon to Taxila on the basis that coins with similar types were apparently struck there.[192] The dating and location of the so-called Taxila coins is now to be challenged and such a clear link between the city and the later Graeco-Bactrian kings should be questioned.[193] The weight standard of these coins will be discussed in detail below, but it will suffice here to note that it does not easily integrate with the apparent standard of the kings' circular monolingual coins.

[190] Bopearachchi (1991), 176.
[191] Yakṣī was favoured by Tarn (1951), 159; Lakṣmī Śrī by Coomaraswamy (1928); Subhadrā by Filliozat (1973).
[192] Audouin and Bernard (1974), 30.
[193] Bhandare (forthcoming); Baralay (2015), 23-24.

A different issue of extraordinary coins was found as part of the excavations at Aï Khanum in 1970.[194] Six square silver coins with the name Agathocles in Greek and Brahmi (**fig. 22**) were discovered in a vessel along with 677 punch-marked *karshapana*. The obverse type is that of a male figure holding a club in his right hand and a plough in his left, with the Greek legend (ΒΑΣΙΛΕΩΣ ΑΓΑΘΟΚΛΕΟΥΣ) running down both fields. The figure was associated by the excavators with the hero Samkarshana-Balarama.[195] The reverse features another male figure this time holding a wheel with his left and what may be a conch in his right, said to be Krishna-Vasudeva.[196] More recently these attributions have been considered 'unambiguous'.[197] The Brahmi legend, *Rajane Agathuklayasa*, a direct translation of the Greek appears here also. The putative associations with Indic religious figures are less contentious than those for the female figure on the bronze coins discussed above because of the attributes held in each type. Nevertheless for our purposes the shift away from a Greek iconographic pantheon is clear; there is no way that either of these figures, with their curled shoes and very different garments, can be equated with characters familiar from Greek religion.

Once more much of the scholarly attention received by these coins has centred on attempts at identifying just how 'Greek' or 'non-Greek' they are. Audouin and Bernard summarised the series as 'un monnayage indien superficiellement hellénisé par une legende grecque'.[198] Others, meanwhile, have highlighted the 'Greek' characteristics of the coins: the deities are rendered 'in Greek style with the full panoply of their attributes in anthropomorphic representations was somewhat alien to the Indian coin tradition at this stage'.[199] Recently an attempt has been made to move beyond such binary distinctions and to bring more pragmatic economic arguments (see Agathocles chapter) to bear upon the coins with the conclusion that we should consider this to be a 'hybrid coinage'.[200]

Another very interesting type of Agathocles is shown in **fig. 24**. This is the only series of coins which bears the name of a Graeco-Bactrian king in this study to have

[194] Audouin and Bernard (1974).
[195] Audouin and Bernard (1974), 10.
[196] Audouin and Bernard (1974), 14.
[197] Srinivasan (1997), 215.
[198] Audouin and Bernard (1974), 34.
[199] MacDowall (2007), 245.
[200] Baralay (2015), 26.

legends in Kharosthi; the other Prakrit legends are all written in the Brahmi script. That is to say that although it was minted under the authority of a Graeco-Bactrian king it does not have any form of Greek legend. On the obverse the coin shows a six-arched hill with a star or sun above. The arched hill, often with only three arches has, in the past, been taken as Mauryan dynastic symbol originally adopted by Chandragupta, appearing not only on punch-marked coins, but other artifacts.[201] Such a connection has recently been correctly rejected.[202] On these other examples, however, the hill is usually topped with a crescent.[203] The obverse legend reads *Agathukreyasa*, of Agathocles. Not only does the king's name not appear in Greek, it is also not prefaced by the royal title. The reverse depicts a three-branched tree in what seems to be an enclosure of some sort. This image is strongly reminiscent of the Bodhi tree under which the Buddha gained enlightenment, and which had a similar enclosure erected around it. The reverse legend reads *Hirañasame*, perhaps to be translated as 'the Golden Hermitage'. As with the previous series of coins the iconography is entirely non-Greek, a transition completed by the omission of a Greek legend. The only trace of Greek influence comes from the translation of the king's name.

Figure 24: Bronze coin of Agathocles, 5.17g (Ashmolean, Shortt Bequest).

The imagery of these coins is also to be found on similar issues. One series features the six-arched hill on one side with no inscription, while the other has a floral symbol with the same *Hirañasame* as found on the coins with the Agathocles

[201] Jayaswal (1934); Allchin (1959).
[202] Bhandare (2012).
[203] A similar depiction of the hill, with the crescent replaced by a sun, appears in the field of some silver coins of Apollodotus (Mitchiner (1975), 116. Type 206).

legend.[204] A second series has an elephant on the obverse accompanied by the arched hill symbol and a cross, while on the reverse a horse is shown once again with the hill. These coins are of two groups with identical types, the only variation being the legend, which reads either *Hirañasame*, or *Doyakadesa*, the Doyaka district.[205] Both of these legends refer to a locale rather than an individual and as such may be thought of as civic issues rather than royal ones. The coins with Agathocles' name differ in a number of ways from his other coins: the legend is written in Kharosthi and has no equivalent Greek, while their iconography is quite different from that of the king's other issues. Although the arched hill should not be considered a 'Mauryan mark' it is to be found on the punch-marked coins. The existence of coins with similar iconography and the *Hirañasame* legend suggests simply that the coins with the name of Agathocles were struck to fit better into a separate coinage tradition. The dating of the similar coins is uncertain so it is impossible to draw an absolute chronology, but it certainly appears that Agathocles had some link with the areas in which these coins were struck. The lack of Greek and the royal title indicates that these were not issues of the king himself, rather local issues. The nature of the link with Agathocles is impossible to know, but the fact that these coins were bronze suggests that they were not struck for trade purposes and were probably intended for local use only. In such a context the likelihood that the appearance of Agathocles' name in Kharosthi on these coins indicates his presence in the region of their minting is the most likely explanation.

Bronze coins even more so than silver, because of their fiduciary nature, had to be trusted by those who used them. Types radically different from those already in circulation run the risk that the coins will not be accepted because of their unfamiliar character. What is certain about these coins is that they represent some sort of shift in the Greco-Bactrian kingdom's relationship with India, or at least the territories south of the Hindu Kush. Whether this change was the result of conquest and a Greek presence in India, or through increased trading is uncertain, but these coins certainly indicate a significant level of interaction of one kind or another with the Indian kingdoms.

[204] Mitchiner (1975), 82. Type 155.
[205] *Ibid.* Types 153 and 154.

Although, once established, coin iconography tends to be conservative in nature some change can be identified across the issues of the six kings in the current study. The first being the change from the idealised portraiture of the Seleucids and Diodotids to the realistic depiction of the king initially under Euthydemus I, a feature unique to Graeco-Bactrian coinage. The second break in terms both of iconography and denominations, is the appearance of rectangular coins with non-Greek types struck to a different weight standard. These coins were clearly produced for a different audience from that for the Attic standard monolingual issues.

The range of denominations, too, differs between kings, with the lack of gold issues after Euthydemus I, the appearance of larger denomination bronzes under Demetrius, and the use of a cupro-nickel alloy all being important changes to the system of coinage. After this broad comparison of the appearance of the coins, both in terms of iconography, as well as metals and denominations, we turn to the locations in which the coins were found.

Chapter III: Find Evidence

The importance of knowing where coins were found, and in what context, cannot be underestimated. A precise location for a hoard of coins, or even a more general knowledge of find-spots in an area, can be of great use in attempts at historical reconstruction. A location can give some idea of the area in which the coins circulated, and therefore perhaps an indication of the political situation there. The composition of a hoard can also be of great use. If the hoard contains a coin that can be dated relatively precisely, it provides a *terminus post quem* for the date at which the hoard was buried, something that can be of great use in establishing the chronology of the coinages in the hoard.[206] The circumstances of the assembly and burial of the coins can also be informative. An increase in the number of 'emergency' hoards, which consist of a sample of coins taken straight out of circulation as opposed to a 'savings' hoard made up of coins gathered over a long period of time, can suggest some sort of political instability in the area, which led to an increased desire to ensure the safety of savings. An increase in the number of hoards may also indicate a similar change in the political situation leaving less opportunity for owners of hoards to recover their coins.

Although the use of hoard evidence is a major tool of Greek numismatics, it must be noted that, as so often in the field of Bactrian history, we are severely lacking in evidence. The scholarly use of a hoard depends heavily on accurate information about its discovery as well as its composition. All too often a hoard has been discovered and then quickly dispersed through local bazaars, eventually reaching coin dealers, the first indication of its existence being the appearance of an unusually large number of coins for sale. In some cases the discovery may be brought to the attention of a numismatist who then has the unenviable task of attempting to reconstruct the original contents of the hoard.[207] This process can often be complicated by a desire on the part of dealers to attach any coins in their possession to a hoard or site in order to increase their value. Many hoards may have gone undetected, with the coins passing unstudied through the trade, resulting in the loss of much valuable information.

[206] Meadows (2009), 742-743.
[207] For an example of this process see Holt (1981). Such a phenomenon has become less regular in recent years as those in possession of the coins are reluctant to discuss their provenance.

One of the first to recognise the importance of the locations in which the coins of the Graeco-Bactrian and Indo-Greek kings were found was Sir Alexander Cunningham. Unfortunately, however, he did not systematically record this information, only mentioning in passing that he had an impression that a particular area produced a significant number of coins of a certain king, often with relation to the monogram that appeared on the coins. The twentieth century, however, brought a change in the way in which coin hoards were documented following the realisation that the hoard itself (rather than just the coins themselves) was a valuable source of numismatic evidence. Finds of coins of the six kings in the current study are gathered together in the table below and plotted on the following map. Before looking at the overall hoard evidence it is worth summarising some of the major finds and the information they provide.

Mir Zakah I (8)

In May 1947 the residents of the village of Mir Zakah (8 in Table 1 and on the following map; 33 miles north east of the city of Gardez in Afghanistan and on the old route from Ghazni to Gandhara) found a deposit of coins in a well. The source of coins was gradually exploited by the villagers until the Afghan authorities stepped in. The *Délégation Archéologique Française en Afghanistan* (DAFA) was able to collect the coins, with a short excavation carried out at the site in the 1948 season and the contents of the hoard being briefly published in 1953.[208] The excavators suggested that the hoard was made up of offerings thrown into two sacred basins, a theory that would explain the preponderance of smaller denominations as well as the long chronological span of the contents (from Indian coins of the fourth century BC to coins of the Kushan king Vāsudeva).[209] The publication of the Mir Zakah hoard contains 19 coins, known for certain to have come from the hoard, of the four later kings with which this study is concerned. Only one coin was silver, a drachm of Antimachus I, while the remainder were bronze or cupro-nickel, a composition in keeping with the identification of the coins as offerings.

[208] Curiel and Schlumberger (1953).
[209] Curiel and Schlumberger (1953), 90-91.

Qunduz (9)

Another hoard of quite different composition was found in an earthenware pot in 1946 at Khisht Tepe approximately 56 miles from Qunduz (9), after which it is named. After initial notices given by Bivar the hoard was finally fully published by Curiel and Fussman in 1965.[210] The deposit consisted of 627 silver coins in total, and is mainly made up of tetradrachms with 17 drachm and 5 double decadrachms. Of these there were 12 tetradrachms of Euthydemus I, 8 of Demetrius I, 5 of Euthydemus II, 3 of Agathocles, and 14 of Antimachus I. The kings represented by the largest numbers of coins were Heliocles I (204 tetradrachms) and Eucratides I (144 tetradrachms), both ruling after the period of the current study. Based on the lack of small denominations and the presence of the very high value double decadrachms, it seems that the hoard was collected for the purpose of saving.

The Qunduz hoard provided a useful confirmation of the previous assumption that bilingual coinage minted on an Indian weight standard was produced by kings expressly for use in their territories south of the Hindu Kush, while the Attic standard coins with a single Greek legend circulated north of the mountains. The lack of any bilingual, non-Attic standard coins in this hoard seems to provide evidence to validate this suggestion.

Aï Khanum (15-18)

A contradiction to this conclusion came with the discovery of a first hoard at the site of Aï Khanum in 1970 during the excavations conducted by the DAFA (15).[211] The hoard was found in the 'administrative quarter' in the centre of the lower city and contained 677 Indian silver punch-marked coins as well as six drachms minted in the name of Agathocles. The hoard was discovered in a large water vessel, and seemed to have been buried hastily, according to the excavators around the time of the final destruction of Aï Khanum.[212] This was the first find of Indian and Indo-Greek coins north of the Hindu Kush.[213] The six coins of Agathocles featured new

[210] Bivar (1953); Bivar (1955); Curiel and Fussman (1965).
[211] Audouin and Bernard (1973); Audouin and Bernard (1974).
[212] Audouin and Bernard (1973), 241.
[213] Audouin and Bernard (1974), 38.

types, which illustrated Indian gods of the Bhagavata religion using a very particularly Indian iconography, while still making use of a Greek legend in addition to one written with the Brahmi script (**fig. 22**).

Since, based on its composition, it seemed that the hoard had been gathered wholesale in the Punjab (or possibly Kapisa), and brought to Bactria as a single transfer of currency, Audouin and Bernard declared that the significance of the hoard should not only be limited to what it tells us of the economic situation.

'Il constitue aussi le premier témoignage materiel d'un large movement qui, mis en brane par la conquête grecque et stimulé par la predication religieuse, allait faire affluer vers l'Asie Centrale les influences indiennes et affecter profondément sa vie religieuse et artistique dans les siècles qui ont précédé immédiatement l'arrivée de l'Islam.'[214]

The significance of this hoard and the coins in it will be discussed further in the Agathocles chapter.

Another hoard was found during the DAFA excavations at Aï Khanum in 1973, this time in a large private house outside the North wall of the city (16).[215] Since it was made up of 63 silver tetradrachms, 49 of which bear the names of Graeco-Bactrian kings, it seems that this was another savings hoard, which had been amassed over a considerable period of time. Its use in historical interpretation has been limited to debate over the end of Eucratides I's reign and the destruction of Aï Khanum.[216] The hoard included 27 tetradrachms of Euthydemus I, including new 'transitional' portrait varieties that changed the interpretation of the system of production of these coins.[217]

Another hoard (17), reconstructed from trade, was said to have come from Aï Khanum in the winter of 1973/1974.[218] The original composition of the hoard is not certain, but Holt's reconstruction included 81 tetradrachms of Euthydemus I, a

[214] Audouin and Bernard (1974), 40.
[215] Petitot Biehler (1975); Bernard (1975), 59.
[216] Bernard (1975).
[217] See Euthydemus chapter below.
[218] Holt (1981).

large sample that allowed Holt to refine the understanding of that king's coinage. The location of the find is perhaps not to be trusted. With the first publication of the results of the excavations at Aï Khanum appearing in the 1970s, it is possible that the location was attached to the group of coins as a way of increasing their values. As with the earlier hoard the evidence from this third Aï Khanum find will be discussed further below with reference to the coinage of Euthydemus I.

In addition to the discovery of hoards, a total of 184 Greek coins were also found during the DAFA excavations (18).[219] All were bronze coins of small denominations, the majority of which (83) were found in the sanctuary of the Temple with Indented Niches.[220] Again historical interpretations have mainly involved the period after that which is the focus of the current study. These coins, of which the find spot is certain, provide an unusual opportunity for the comparison of the monograms on the reverses of the coins with the location of discovery. Unfortunately, there is little correlation between monograms. The bronzes of Euthydemus I all omit a monogram, a regular feature of the first group of that king's bronze issues. For later kings the two most common monograms ( and ), taken later in this study to indicate two separate mints, are found equally, providing no insight into the geographical locations of these mints.[221] With the coins from Aï Khanum we unfortunately come to the last large group of coins that came from an official archaeological expedition and was published in full and in a systematic way. We come now to hoards for which we only have limited information.

Mir Zakah II, Aï Khanum IV, Kuliab, and Vaisali

In 1992 a second hoard was apparently found at Mir Zakah. Described as 'one of the largest ancient coin deposits ever attested in the history of mankind', it was thought to contain about 500,000 specimens.[222] Unfortunately, like many of the coin finds in Afghanistan, the best examples have made their way into trade and it is likely that less attractive coins will not have escaped being melted down.[223] Most of our

[219] Bernard (1985).
[220] Bernard (1985), 156.
[221] Bernard (1985), 154-155.
[222] Bopearachchi (1999a), 109; Bopearachchi (1999b).
[223] A number of the coins attributed by Bopearachchi and Rahman (1995), 208-215 are in a very poor state of preservation. If these coins are indicative of the majority of those from the hoard it is unlikely that many made it to auctions.

very limited knowledge of this hoard comes from the work of Osmund Bopearachchi, who has not published any details of the complete hoard. It seems to have had a similar composition to that of the first Mir Zakah hoard, with Indo-Scythian coins making up the majority of the material.[224] Without a secure indication of the coins from the hoard it has been omitted from this discussion. As we shall see, the discovery of the second Mir Zakah hoard may have had a significant impact on the number of coins in the study.

Two more hoards have appeared more recently and have been recorded by Bopearachchi as they made their ways through the coin trade. One hoard, known as Aï Khanum IV is said to have been unearthed in 1992 by another farmer at the famous archaeological site, while the second apparently came from Kuliab to the north east of Aï Khanum.[225] Bopearachchi admits that he was only able to reconstruct around 50% of the first hoard, and that 'it is difficult to say whether all the coins were found in one or several hoards. What is certain is that all the coins in question are either Greek or Graeco-Bactrian, struck according to the Attic standard.'[226] On such a basis it becomes very difficult to draw any conclusions from the composition of the 'hoard', particularly since Bopearachchi bases his reconstruction on personal examinations of coins 'in the bazaars and private collections in Pakistan, U.S.A., Japan and several European countries, or through photographs and casts.'[227] Unlike Holt's reconstruction, the criteria on which coins are attributed to the so-called 'Aï Khanum IV' hoard are never explained. It therefore becomes impossible to look at the coins as a hoard. Once again, since no totals of the coins found in this hoard have been published, they have had to be omitted from this study.

Fortunately, Bopearachchi has provided a more thorough publication of the hoard from Kuliab (20). Again he admits that he has only been able to examine and publish 205 coins, while his information suggests that the hoard originally consisted of over 800.[228] This hoard does (in its published form) contain an unusually large number of small denomination silver coins, and apparently the

[224] Bopearachchi and Rahman (1995), 11.
[225] Bopearachchi (1999a); Bopearachchi (2000).
[226] Bopearachchi (1999a), 110.
[227] Bopearachchi (1999a), 110.
[228] Bopearachchi (1999c), 16.

original make-up had many more. The presence of a small number of imitations is also revealing.

A final hoard falls into this group of finds about which we have limited and sometimes contradictory information. In 2001 Bopearachchi and Grigo published a note on a hoard of gold staters of the Diodotoi and Euthydemus I.[229] The hoard was initially said to have contained over one thousand coins and to come from Mathura. This was then apparently revised to a total of five hundred coins said to have been found at Vaisali in Bihar state in north eastern India. Finally the number of coins was reduced to seventy, a change apparently to be attributed to the melting down of coins by the local villagers as well as dealers hiding coins to prevent a dramatic increase in the number of these previously rare coins on the market. Such a background to the hoard is clearly far from ideal and causes significant problems for the interpretation of the find. The coins said to have come from this find, as well as its location as the easternmost find, will be discussed in some detail below (see Euthydemus chapter).

North of the Oxus

As well as coin finds from areas in Bactria itself, other site finds have been published from the Soviet excavations at the famous 'Temple of the Oxus' at Takht-i Sangin in modern Tajikistan (19) as well as those found during excavations at Merv in Turkmenistan (21).[230] These are the northern most finds of coins of these six Graeco-Bactrian kings, and are all low value denominations in bronze or nickel. No hoards were found at these sites; the coins were found individually in the course of excavation. Although coins were not found in large numbers the discovery of bronze coins of Euthydemus is particularly interesting, while the omission of coins after Euthydemus II may be indicative of a change in the political situation in the area under Antimachus I.

[229] Bopearachchi and Grigo (2001).
[230] Zeymal (1997); Smirnova (2007).

Table 4: Published hoard and site finds.

	Find, publication, published burial date	Euthydemus I	Euthydemus imitations	Demetrius I	Euthydemus II	Pantaleon	Agathocles	Antimachus I
1	Kuh-i-Tuftan 1902 (*IGCH* 1803) *c.* 140 BC			1 obol	1 obol	1 obol		
2	Susa 1933-34(*IGCH* 1804) after 140 BC	1 tetradrachm						
3	Susiana 1958-59 (*IGCH* 1805) *c.* 138 BC	1 tetradrachm						
4	Susiana 1965? (*IGCH* 1806) after 138 BC	2 tetradrachms						
5	Susa 1951-52 (*IGCH* 1809) *c.* 145-100 BC	1 tetradrachm						
-	Media* 1923 (*IGCH* 1813) 90-85 BC	2 tetradrachms		2 tetradrachms				1 tetradrachm
6	Oxus River 1887 (*IGCH* 1822) *c.* 180-170 BC	2 AU staters, 4 tetradrachms, 1 obol, 5+ AE				1 AE	1 drachm, 3 AE, 3 nickel	4 tetradrachms
7	Begram (Masson)	3 AE		1 AE		7 AE	43 AE	
8	Mir Zakah 1947 (Curiel and Schlumberger, 1953)				1 AE	9 AE	1 CuNi, 4 AE	1 drachm, 2AE
9	Khisht Tepe, Qunduz 1946 (Curiel and Fussman, 1965; *IGCH* 1826) after 140	12 tetradrachms		8 tetradrachms	5 tetradrachms		3 tetradrachms	14 tetradrachms
10	Bukhara 1821 (*IGCH* 1827) 2nd century BC		3 tetradrachms	1 tetradrachm				
11	Tali-Murdapatou, near Bukhara 1938 (*IGCH* 1828) 2nd century BC		unknown number					
12	Taxila 1884 (*IGCH* 1833) 2nd century BC					9 square AE	15 square AE	
13	Jalalia 1911 (*IGCH* 1835) 2nd century BC?			unknown number AE				
14	Balkh 1974? (*CH* II.88) 150 BC	80		11	1		3	2
15	Aï Khanum I 1970 (Audouin and Bernard, 1973; *IGCH* 1823) *c.* 170 BC?						6 square AR	

	Find, publication, published burial date	Euthydemus I	Euthydemus	Demetrius I	Euthydemus II	Pantaleon	Agathocles	Antimachus I
16	Aï Khanum II 1973 (Petitot-Biehler, 1975; *CH* III.53) 160 BC	27 tetradrachms		3 tetradrachms	1 tetradrachm		3 tetradrachms	2 tetradrachms
17	Aï Khanum III 1973-74 (Holt, 1981) *c.* 140	81 tetradrachms		8 tetradrachms	3 tetrdrachms		6 tetradrachms	2 tetradrachms
18	Aï Khanum site finds (Bernard, 1985) ?	49 AE		5 AE	5 AE		3 AE	3 AE
19	Takhti-Sangin site finds (Zeymal, 1997) ?	15 AE			2 AE		1 CuNi	
20	Kuliab (Bopearachchi, 1999c) 140 BC?	23 tetradrachms, 5 drachms		5 tetradrachms, 1 drachm, 44 obols, 5 imitation obols	3 drachms, 5 obols		3 tetradrachms, 2 drachms	5 tetradrachms, 3 drachms, 39 obols, 1 imitation obol
21	Merv site finds (Smirnova, 2007) ?	4 AE		3 AE	1 CuNi; 1AE			
22	Vaisali 2000 (Bopearachchi and Grigo 2001)	? AU staters						

*The location for (*IGCH* 1813) was given no more specifically than 'Media'. It has therefore been omitted from the following map.

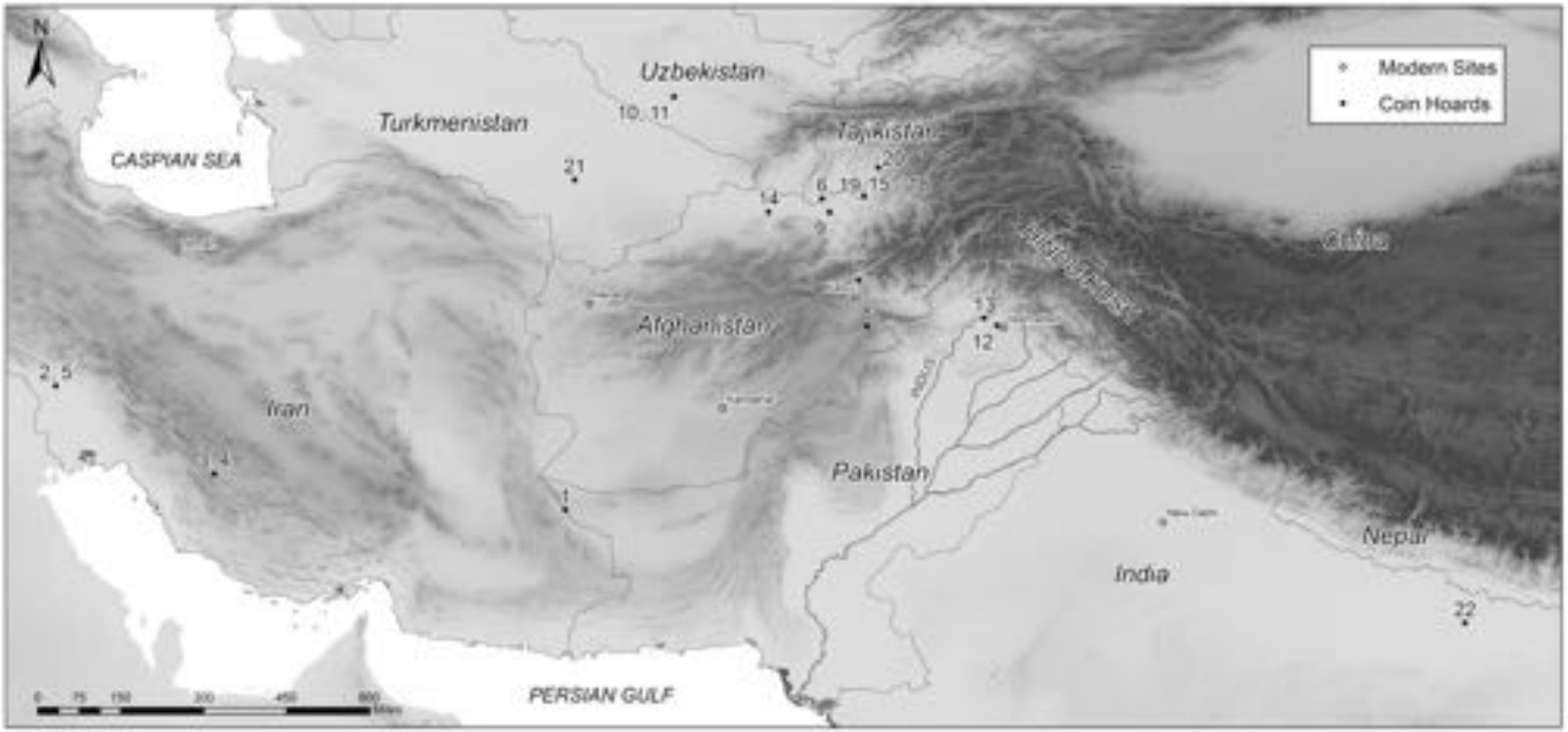


Figure 25: Map of hoards and finds.

One of the main questions that the scholarship of Graeco-Bactrian hoards has aimed to answer is the extent to which the circulation of particular series of coins was limited to different areas. On a large scale this can involve the assumption that monolingual coins (with only a Greek legend) circulated within the Graeco-Bactrian kingdom north of the Hindu Kush, while the bilingual coins (using the Kharosthi or Brahmi script in addition to the Greek legend) issued by later kings were limited to use south of the mountain range from where the Prakrit language originated. Attempts have also been made to estimate the extent of the kingdom under a particular king based on where coins of that king are found. Given the limited evidence for circulation, deductions of the latter kind are particularly dangerous, particularly when coupled with the assumption that a certain monogram represents a mint.

Table 4 shows every hoard that has been fully published, and which contains coins of the six kings of this study. Each of these finds is then plotted on the map on the following page (**fig. 25**), allowing some interesting trends to be identified. The assumption that monolingual coins were produced for circulation north of the Hindu Kush and bilingual coins for the south is borne out. The only finds of square Indian standard bronze coins came from south of the Hindu Kush at Taxila (12) and Jalalia (13). There is still, of course, the famous exception from the first hoard found at Aï Khanum, although it seems, as we saw earlier, that this hoard was taken out of circulation in India wholesale, with a very large number of earlier Indian punch-marked coins, and does not represent a snapshot of coins in circulation in Bactria.

The evidence here does not seem to support another suggestion. Based on his analysis of a number of Graeco-Bactrian and Indo-Greek coin hoards, Bopearachchi suggested that the area north of the Hindu Kush was one that used a barter economy rather than a monetary one, with the high value tetradrachms being reserved for particularly important transactions.[231] During the excavations at Aï Khanum (18), Takht-i Sangin (19), and Merv (21), lower denomination bronze coins of a range of the kings have been found. Certainly it seems that at Aï Khanum, if not elsewhere, the large numbers of these bronze coins suggests that they were used in an economy that was monetised to some extent. Likewise the

[231] Bopearachchi (1999c), 89.

Kuliab hoard (20), which contained large numbers of obols, suggests a system that relied on a full range of denominations, rather than only on the tetradrachms. As with much of Greek coinage, the evidence for the use of small denominations has often been overlooked, and it is quite likely that many finds have not been reported, with preference given to the more famous, attractive, and valuable silver tetradrachms. In fact, other than the hoard from Kuliab, very few silver obols and drachms have been recorded in hoards or other finds, while these coins are relatively well represented in large collections of Graeco-Bactrian coins. It is quite likely that the majority of smaller silver coins found in the area today are destined for the melting pot.

The hoards that were deposited furthest west of all (2-5) only include small numbers of silver tetradrachms of Euthydemus I in among larger, mainly Seleucid, hoards. The fact that no later coins have been found this far west may suggest that the potential for trade between the Seleucid Empire and the Graeco-Bactrian kingdom ended with the rise of the Parthian state. An anomaly occurs, however, at Kuh-i-Tuftan (1), where a single obol each of Demetrius I, Euthydemus II, and Pantaleon were found in among a small hoard containing a number of imitations of Seleucid coins as well as obols of five Graeco-Bactrian kings.

Another feature illustrated by the map is the appearance in the two northern-most hoards (10 and 11) of imitations of the tetradrachms of Euthydemus I. Imitations of the obols of Demetrius and Antimachus were also found in the Kuliab hoard (20). Remarkably little scholarly attention has been given to these imitation coins, and it is usually assumed that they were produced by the Sogdian nomads who lived to the north of the Graeco-Bactrian kingdom, a suggestion backed up by their find spots indicated here. It is easy to assume that these coins were produced either as counterfeits, or by a people whose idea of coinage was limited to those with which they came into contact, leading to a wholesale imitation of Bactrian coinage. Whether or not these imitations should be seen in such a context will be given further attention later in this study.

Of our six kings, the coins of Euthydemus I have the largest representation in the finds. His coins feature in 70 per cent of the available hoards, and often in

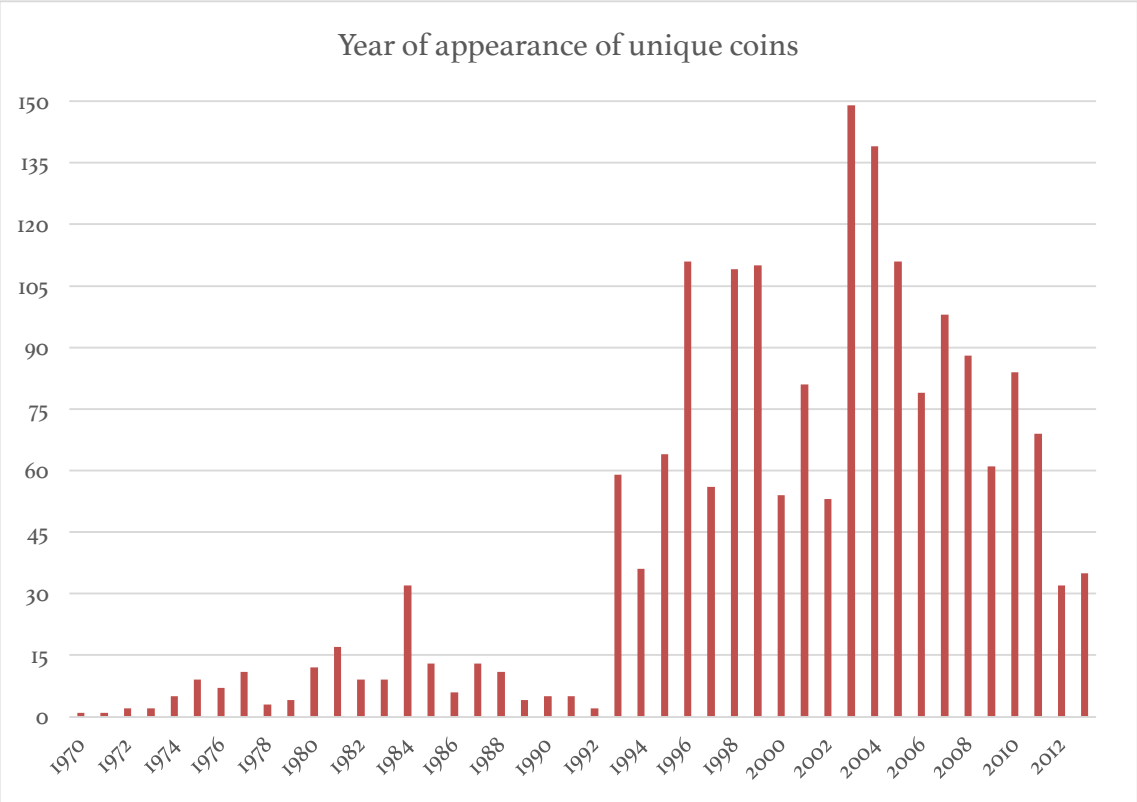
significant quantities. The smallest representation is that of the coins of Pantaleon, which appear in just under a quarter of the total number of hoards. When the coins of Pantaleon are found they are almost always of small denominations, and bronze. This small level of representation in the finds is a dangerous one to interpret. As with the number of coins in large collections, it is difficult to tell whether the small quantity of finds is due to a preservation bias of some sort or an originally low level of production, which could perhaps in turn be said to indicate a short reign. Such conclusions based solely on this evidence are undoubtedly unsafe, and at the moment it will be sufficient to note this phenomenon.

The work of the die study involves looking closely at each coin to establish die identity. In the process it is essential to ensure that the same coin is not included in the study more than once. This leaves an interesting set of data that can be analysed to investigate trends in the market for the relevant Graeco-Bactrian coins. The chart below shows the number of coins that appeared for sale for the first time in each year from 1970 to 2013. Only coins that were featured in commercial numismatic publications that were available for study have been included. In some cases collections of coins that had been gathered over many years (as indicated by the published provenance) were offered for sale together at auction.[232] When coins were labelled as part of a previous collection they have been omitted from the chart.

There is a clear division in numbers of coins appearing for sale for the first time between 1970 and 1992 and those which came onto the market from 1993 onwards. Since 1970, 1,861 unique coins of the six Graeco-Bactrian kings have appeared in commercial numismatic publications. Ten per cent of these (183) were offered for sale between 1970 and 1992, with 90 per cent (1,678) first appearing after 1993.[233] There is one small peak in the first period in 1984 when 32 coins were offered for sale for the first time. It is tempting to link this to the Aï Khanum hoard

[232] The large collection of Bactrian coins that appeared in the Triton II sale in 1998 is an excellent example.
[233] Having discussed this trend with those familiar with the numismatic market it is apparently quite different from the usual expected pattern for Greek coins. The introduction of metal detectors in the 1980s and various financial crises are often responsible there for peaks in the market, although one must be careful not to confuse the first appearance of a coin with the number of coins for sale in a particular year, the latter far more susceptible to economic factors with sales often caused by a need to release capital.

reconstructed by Holt and published in 1981. Of the few coins it was possible to identify from Holt's publication, however, none were offered for sale in 1984, mainly appearing in lists and catalogues from 1981 or earlier. The hoard does not, then, seem to be clearly represented in the chart. It is possible that dealers did not offer all the coins from the hoard in the same year, instead preferring to spread out the high value tetradrachms to maintain lower supply and prevent a drop in prices. It is equally likely that many of the coins that made it into the possession of auction houses and dealers were not sold in a way that allowed them to appear in a price list or auction catalogue, perhaps being sold from stock or offered privately to a collector with a known interest in the coins of the region. Nevertheless, with the exception of the years 1981 and 1984 the number of coins appearing for sale up to 1993 remained below 15 each year.



The change from 1993 onwards is enormous. Of course the second Mir Zakah hoard with its reportedly huge number of coins was found in 1992. Such a connection cannot simply be coincidence, but there are probably other factors involved, the most significant being the political situation in Afghanistan. In 1992 the ongoing civil war in the country entered a new phase resulting in the capture of Kabul in 1996 by the Taliban. One of the results of this was the looting of the National

Museum of Afghanistan and other institutions.[234] Coins, as small, easily carried objects with an intrinsic metal value were a prime target and it is likely that many made their way into the hands of western dealers only to appear on the coin market. The largest peak on the graph, in 2003 comes after the NATO led invasion of 2001, again coins, whether looted from museums or directly from the ground, were an easy source of income for the many different factions fighting in Afghanistan.[235] Recent satellite images of Aï Khanum show a site covered in regularly spaced excavation pits presumably used to strip the site of any of its remaining artifacts.

Although we have many Graeco-Bactrian coins, we know where only a very few were found and even then a lot of information is only hearsay and ultimately unverifiable. The coins themselves, however, can tell us much and it is to them that we now turn.

[234] Holt (2009).
[235] Holt (2012), 107 cites an increase in the number of coins appearing for sale on websites such as eBay, a source that has caused great difficulty for the libraries of commercial numismatic publications.

Chapter IV: Euthydemus I

Euthydemus I and his son, Demetrius I, are unusual in the list of Graeco-Bactrian kings since they are attested in literary sources in addition to their appearance in a single inscription. Furthermore, unlike later kings, these mentions are quite detailed, giving information of the kings' conflict with Antiochus III at the end of the third century. The narrative does, however, centre solely on this period of warfare, with no discussion of the situation in Bactria before or after the *anabasis* of the Seleucid king, or even any indication of the dates or lengths of the kings' reigns. A particular detail of Euthydemus' negotiation with Antiochus, relayed by Polybius (XI. 39), informs us that Euthydemus came to rule in Bactria having destroyed the descendants of those who rebelled against the Seleucids. This has clear implications for the circumstances surrounding the beginning of Euthydemus' reign, but is sadly not elaborated upon. Therefore, after what we must assume to have been a violent beginning, Euthydemus had to contend with the Seleucid invasion and the resulting siege of Bactra. The Kuliab inscription implies that Demetrius was elevated to some royal status while Euthydemus was king, although he was not given the royal title.[236]

In terms of numismatic scholarship, we are also on a sounder footing with Euthydemus I. Not only have the coins of his immediate predecessors, the Diodotoi, been the subject of two thorough studies,[237] but attempts have also been made at the classification and interpretation of the various series of Euthydemus' coins and the resulting impact on historical reconstruction.[238] The availability of written sources as well as the large number of coins of Euthydemus in important numismatic collections seem to have been the reason for this.[239] The presence of significant numbers of Euthydemus tetradrachms in two hoards found at Aï Khanum has also given scholars opportunity for smaller-scale studies of his coinage.[240]

[236] Bernard *et al.* (2004).
[237] Kovalenko (1996); Holt (1999).
[238] Bivar (1951); Bopearachchi (1992); Kritt (2001).
[239] Bivar (1951), 22.
[240] Petitot-Biehler (1975); Holt (1981).

Diodotid coinage

Before embarking upon a study of the coinage of Euthydemus it is important to consider the numismatic system used by his predecessors. As we have already seen, the coinage of the Diodotoi has been the subject of a number of recent studies. While only one of these, that of Kovalenko, was a full die study, those of Holt and Kritt had access to a larger corpus of coins and dealt with the material in a systematic way.[241] Holt's organisation of the coinage and its method of production was the most thorough and convincing and was the basis of Kritt's later reinterpretation. It is worth giving here a brief summary of the picture of the coinage in Holt's and Kritt's work as a starting point for the study of Euthydemus' coins.

The precious metal coins attributed to Diodotus I and II have a consistent reverse type of Zeus hurling a thunderbolt. The legend, however, varies reading either ΒΑΣΙΛΕΩΣ ΑΝΤΙΟΧΟΥ or ΒΑΣΙΛΕΩΣ ΔΙΟΔΟΤΟΥ. The style of the obverse diademed head also changes from what has been interpreted as an older depiction and a younger one. Until recently it was assumed that the coins with the Antiochus legend were produced by Diodotus I, who was not yet prepared to take the royal title himself, therefore the name of the Seleucid king was retained on the coins as a transitional stage in the independence of the Graeco-Bactrian kingdom.[242] The 'Diodotus' coins were thought to have been struck at some point after this, presumably when the Bactrian kings considered themselves completely free of Antiochus II's suzerainty. The interpretation of the portraits on the coins as 'older' and 'younger' variants has created more confusion in the organisation of the coinage. It is natural to assume that the older portraits represent the first Diodotus while the younger examples show his son. This distinction does not, however, align with the name in the reverse legend with older portraits appearing on a small number of 'Diodotus' coins in addition to the 'Antiochus' issues. To explain this phenomenon Holt proposed an issue of coins under Diodotus II showing a posthumous portrait of Diodotus I.[243]

[241] Kovalenko (1996); Holt (1999); Kritt (2001); Kritt (2015).
[242] Holt (1999), 100-101.
[243] Holt (1999), 92.

Such an arrangement seemed overly complex and has been challenged more recently. Jens Jakobsson has suggested that there were in fact three kings of the Diodotid dynasty: Diodotus I, Diodotus II, and a third king, perhaps another son of the first Diodotus, Antiochus.[244] He raised a number of problems with Holt's theory. Some of these difficulties relied on comparisons with other Seleucid officials who declared their independence from the Empire (Molon, Timarchus, and Achaeus the Younger). All of these individuals produced coinage in their own name straight after their break with the Seleucids.[245] Jakobsson also cited the 'commemorative coins' produced under Agathocles as supporting evidence for a new king Antiochus. As we shall see later these coins were produced with an unusual reverse legend indicating that they were struck in the reign of Agathocles or Antimachus. The types that appeared on both sides of these issues were copied from various earlier kings, the majority being Graeco-Bactrian, with the exception of Alexander the Great, and a king identified as 'Antiochus Nicator' by the obverse legends of the coins. This Antiochus had traditionally been considered to refer to Antiochus II, the Seleucid king from whom Diodotus I had seceded. This attribution had always been problematic since the Seleucid Antiochus' epithet was well attested as *theos* and not *nicator*.[246]

Jakobsson rearranged Holt's organisation of the Diodotid coinage, maintaining the system of two mints, but changing their order. On the basis of the control marks as well as the obverse style of the portrait this resulted in a reconstruction in which Diodotus I and II both issued coins at a Mint A with Diodotus II opening Mint B. Both mints were used under Antiochus with Mint A remaining in use until it was taken over to strike some of Euthydemus' first issues. Jakobsson based much of his argument on objections to the established hypothesis, but without a die study he was unable to provide positive proof of his own reconstruction. He did, however, highlight the scope for die links between the 'Antiochus coins' and the early coins of Euthydemus suggesting that the portraits on the coins were so similar as to have been the work of the same die-cutters.[247]

[244] Jakobsson (2010).
[245] Jakobsson (2010), 23-24.
[246] Holt (1981), 79. Holt in fact suggested here that this Antiochus was perhaps a member of the Diodotid dynasty, but seems to have abandoned this hypothesis in later work.
[247] Jakobsson (2010), 29.

Sound numismatic evidence to support Jakobsson's reconstruction was not long in coming. In addition to the transfer of three monograms between the 'Antiochus' coins and Euthydemus' early issues, which Jakobsson had cited, Zeng identified several die links between gold staters.[248] With the appearance and progression of die flaws between the various die-linked coins this new evidence shows an order of minting from Diodotus II, to Antiochus, and finally to Euthydemus I. This seems to rule out the likelihood that the 'Antiochus' coins came first and may have significant implications for the current reconstruction of the early history of the Graeco-Bactrian kingdom. Zeng's study was not a full die study of the coinages, but was instead based on coins he observed on the market and assigned to a hoard (22) first mentioned in 2001 and said to have been discovered in the village of Vaisali situated in Bihar State in eastern India.[249]

This hoard is another example of the tantalising details gathered from the region, which often provide evidence that raises more questions than it answers. The authors of the initial short notice of the hoard were uncertain how many coins the hoard originally contained. They refer to rumours of one thousand coins, but suggest that the actual number was 70 gold staters, attributing the reduction to melting down of some examples in the village as well as the concealment of other coins by dealers in order to prevent the market being flooded with such high value specimens.[250] Whatever the original composition of the hoard, the authors were only able to publish seven gold staters: five coins with the name of Antiochus, and two of Euthydemus.

The location of the hoard in eastern India is surprising and has led to different attempts at explaining why so many gold coins would have travelled a considerable distance from Bactria. Many of the coins said to have come from the hoard have a distinct chisel cut on the obverse across the head of the king, running down to the right from the edge of the coin. The cuts are limited to Diodotid coins (that is to say no Euthydemus staters have the mark) and are also to be found on examples known prior to the discovery of the Vaisali hoard. Bopearachchi and Grigo

[248] Zeng (2013).
[249] Bopearachchi and Grigo (2001).
[250] Bopearachchi and Grigo (2001), 22.

suggested that these marks were test cuts.[251] Such cuts are often present on coins from hoards in the Near East from the archaic period, a phenomenon attributed to the lack of familiarity of the local population with coins and the authority which guaranteed the precious metal content.[252] Presumably the users of the coins in Eastern India would have been in a similar position regarding the gold Bactrian staters. Bopearachchi's and Grigo's explanation of the burial of the hoard in India was to suggest it was linked to trade between that region and Bactria.

Brian Kritt has recently re-evaluated the hoard and gathered a large sample of coins that appeared on the market from 2001 onwards.[253] He argued for a different interpretation of the location of the Vaisali hoard. Based on his dating of the Euthydemus staters from the hoard (*c.* 220/218) he proposed a closing date of 215.[254] Kritt also had a more nuanced view of the cuts that appear on the staters from the hoard. He observed that the coins with the cuts are all Diodotid issues, while the Euthydemus staters were untouched. He also identified cut staters not from the Vaisali hoard, which appear to have circulated in Bactria, and some of which are not Diodotid coins but those of Antiochus I.[255] On the basis of this evidence, as well as the consistent placement of the cut, Kritt suggests that the practice was carried out at the start of Euthydemus' reign and that 'the purpose of the cuts could have been to certify the provisional use of the cut coins from earlier reigns for state or commercial purposes'.[256] The suggestion that the cuts were part of an official exercise is most likely correct, given their consistent placement on the coins. Why, however, it was only felt necessary to cut gold staters of previous kings, while tetradrachms and other denominations remained in circulation untouched is unclear. Kritt used this observation as corroboration for his theory that the coins were transported to India to finance Demetrius I's campaigns in that country.[257] Of course, the context of the burial of the hoard is impossible to know, particularly given the contradictory reports of its composition. Either trade or military campaigns are possible, but the location of the hoard may suggest that the former is

[251] Bopearachchi and Grigo (2001), 23.
[252] Carradice and Price (1988), 98.
[253] Although Kritt identifies which coins in his corpus came from the Vaisali hoard it is unclear what criteria he used to establish their provenance. In many cases it seems that simply the appearance of a coin on the market in the first decade of the 21st century is enough to assign it to the hoard.
[254] Kritt (2015), 22.
[255] Kritt (2015), 34.
[256] Kritt (2015), 33.
[257] Kritt (2015), 33.

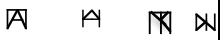
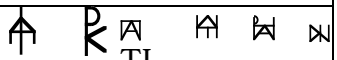
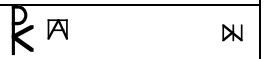
more likely. Vaisali itself is the site of an Aśokan pillar, and not far from Pataliputra, in a region of significant importance in the Mauryan empire.[258] There is much evidence of trade in the area, even including lapis lazuli, which must have come from Bactria.[259] It is equally valid then, to see the hoard from a non-Greek perspective, perhaps acquired through trade and repurposed as tribute, or a Buddhist donation or temple treasure, it is impossible to say.

The unclear circumstances of the find, in particular the uncertain criteria used to assign staters to the Vaisali hoard, as well as the limitation of die links to coins that have recently appeared on the market are not the ideal basis for any reconsideration of the history of this period with the identification of a new Diodotid king 'Antiochus'. Zeng is apparently preparing a complete die study of the gold staters of the Diodotoi, Antiochus, and Euthydemus, which is eagerly awaited. With the publication of his die links the identity of a third Diodotid king, Antiochus, as originally suggested by Jakobsson has become the most probable reconstruction of the early history of the Graeco-Bactrian kingdom. Throughout this study, to avoid confusion the terms 'Diodotoi' and 'Diodotid' should be assumed to include the possibility of this new Antiochus unless an interpretation to the contrary is stated explicitly.

[258] Falk (2006), 220-223.
[259] Singh (2009), 289.

System of coinage

Table 5: System of Coinage of Euthydemus I.

Denomination	Number of examples (n)	Weight range (g)	Mean weight (g)	Standard deviation	n/d_O	O	Monograms
Gold							
AU Octodrachm	1	32.73	n/a	n/a	n/a	n/a	
AU Stater	17	8.09-8.68	8.27	0.14	3.4	7.1	
Silver							
AR Tetradrachm	659	12.57-16.99	16.13	0.52	3.7	240.9	None  A N TI
AR Drachm	36	3.08-4.12	3.86	0.21	1.9	40.2	None 
AR Hemidrachm	14	1.46-2.04	1.70	0.17	1.1	n/a	None 
AR Obol	10	0.41-0.66	0.57	0.07	1.7	n/a	None
AR Hemiobol	10	0.15-0.29	0.24	0.05	n/a	n/a	None
Copper							
AE Double	96	5.26-11.82	7.77	0.98	1.6	n/a	None   anchor ΔI
AE Unit	10	2.95-5.07	3.82	0.68	1.1	n/a	None   E
AE Half	8	1.47-2.28	1.96	0.27	n/a	n/a	None  
AE Quarter	2	0.76-0.79	0.78	0.02	n/a	>2	None

The table provides a useful overview of all the coins and denominations issued under Euthydemus. He was the only king of the six in the study to strike gold coins, one of which is a unique example of an unusual denomination, identified as an octodrachm.[260] Although the sheer number of Euthydemus tetradrachms in existence has long been cited as evidence that the king had a large output of these coins,[261] the die study has confirmed this with an estimate of 240.9 obverse dies used in their striking, a number, as we shall see later, that is over twice as large as that for each of the other kings.

Under Euthydemus smaller silver denominations were not neglected with drachms, hemidrachms, obols, and hemiobols all struck. The small size of these

[260] Although gold coins have been attributed to Demetrius I they are of a very different nature from earlier Graeco-Bactrian issues and are most likely the product of the later Indo-Greek kingdom.
[261] Bopearachchi (1991), 47.

coins often means that they are poorly preserved, making estimates of the initial size of their production difficult, but the simple fact that they were struck at all is of interest since they are often missing from the denominational systems of the later kings. A similar phenomenon is to be noted with the copper coins, with four different denominations. As mentioned above the names of these denominations should not be taken as indicative of their relative value, and are used simply as a more accessible identification of each denomination. Double and unit copper coins are not rare under the later kings in this study, but we do not find half and quarter units as struck under Euthydemus.

The final column of the table lists the monograms and control marks that appear on the reverses of many of these coins. Once again Euthydemus differs somewhat from later kings in issuing Attic standard coins that, in some cases, do not have a monogram. The symbols have been arranged in columns to show the appearance of the same sign on coins of different denominations.

The first thorough attempt at arranging the large number of coins attributed to Euthydemus I was that of Bivar.[262] He identified five different groups that showed a chronological progression. His attribution was based primarily on the die axis of the coins. Unlike the other five kings in this study whose Attic standard coins all share a regular die axis of twelve o'clock, under Euthydemus a significant proportion of the output was struck with a six o'clock alignment. As well as die axis, the control marks were also taken into account, as was the style of the obverse portrait, which is quite variable between the different issues of Euthydemus, some showing an idealised 'younger' portrait, while others feature a realistic 'old-aged' image with a variety of styles in between, which Bivar suggested were indicative of a middle-aged representation of the king. One final consideration was the depiction of the club in relation to Heracles on the reverse type. On some examples the club rests directly on the hero's thigh, while in others it is supported by a pile of rocks, which is itself separate from the stones on which Heracles sits. This last difference was a characteristic feature of each of Bivar's groups.

[262] Bivar (1951).

Bivar's organisation of the coins is a sound one, relying mainly on technical numismatic criteria, and in general avoiding the temptation of linking changes in the coinage to the few historical events of Euthydemus' reign that we know from literary sources. There are, however, a number of problems with his reconstruction. Bivar only based his groups on coins in the collections of the British and Ashmolean museums (with occasional reference to those held at the Fitzwilliam Museum). This resulted in a relatively small sample of coins which he was able to consult and use as the basis of his different groups. Bivar's article is now dated, having been published in 1951. Since this date vastly more Bactrian coins have been discovered and appeared on the market. A number of these have serious implications for the overall system of coinage under Euthydemus. Finally, Bivar assumed that all of the coins of both Euthydemus and Demetrius were minted at Bactra, a feature of the reconstruction that is made obvious in the title of his article.[263] It is not clear why he attributed the coinage to Bactra. He may have simply assumed that the majority of the coinage would have been struck at the 'capital city'. Bivar did, however, include an appendix with a few coins 'evidently of different origin'. The many coins that have appeared since Bivar's work have made it clear that a reconstruction that assumes the coins were produced at a single mint is untenable.

One of the most important discoveries since Bivar's work was the appearance of a hoard apparently discovered by an Afghan farmer in the winter of 1973/1974 in the vicinity of Aï Khanum and dispersed in trade shortly afterwards. Fortunately coins from the hoard were photographed at various times in London and New York and a thorough attempt at reconstructing its original composition was made by Frank Holt.[264] This process of dispersal and reconstruction is clearly not the ideal basis for the interpretation of the hoard, since it is often far from certain which coins came from the hoard rather than simply being offered for sale at a similar time. For example, of the 81 tetradrachms of Euthydemus I said to have come from the hoard, Holt was aware that one was an intrusion, although he was unsure which.[265] This hoard is the largest group of Euthydemus I coins thought to have come from a single deposit and included a number of control marks and subsidiary marks that

[263] 'The Bactra coinage of Euthydemus and Demetrius'.
[264] Holt (1981).
[265] Holt (1981), 21.

were unknown to Bivar. The appearance of a unique gold octodrachm acquired in the late 1960s by the Cabinet des Médailles and a new portrait variant (both of which will be discussed below) in the meantime allowed Holt to suggest a more complex organisation of the coinage. In particular, he identified a 'transitional' group of coins which included the 'aged' portrait, but a monogram that was from one of Bivar's earliest groups. The simple linear progression from Groups 1 to 5 that had been suggested was no longer plausible. Holt also refined Bivar's interpretation of the reverse type with particular reference to the position of Heracles' club and the shape of the rocks on which the hero is seated. These observations led Holt to divide the coinage into two different sets (A: Bivar's Groups 1-4 and B: Group 5). These sets were said to have a chronological progression with the suggested organisation being two major mints or workshops with the first replaced by the second towards the end of Euthydemus' reign.[266] Within that reconstruction Holt has since refined his view, suggesting that the coins of set A were struck at several mints while those of set B were produced to a higher standard at a single mint.[267]

These reconstructions of the precious metal coinage of Euthydemus I have been elaborated further in two books by Brian Kritt.[268] I did not embark upon the die study with a particular organisation of the coinage in mind. When complete, however, it was clear that my arrangement was in some ways similar to that proposed by Kritt in 2001, albeit with some alterations. In fact, some of these changes have been made by Kritt in his most recent work, which was only available to me at the very end of the writing of this study. There are, however, differences in the interpretation of the models, and particularly in the absolute chronology, which are discussed below. I have arranged the coins into my own groups, with Kritt's groups indicated for ease of comparison.

I will deal first with the gold and silver coins issued under Euthydemus, which have clear connections between them, and then, separately, with the bronze issues. Kritt refined the systems proposed by Bivar and Holt and identified three mints (A, B, and C) at which precious metal coins were struck. He subdivided the output of each mint based on the portrait models he identified as well as the reverse style of the

[266] Holt (1981), 24.
[267] Holt (1999), 131.
[268] Kritt (2001) and (2015).

seated Heracles. Here I have preferred to subdivide groups less often, omitting the minor reverse differences and focusing more on the variations in obverse portrait style. Many of Kritt's subdivisions cause difficulties for interpretation with the different monograms on the reverse of the coins. For example, in his organisation of the first coins of Mint A, he identifies coins with one monogram as 'A1', those with a second monogram as 'A2', a third as 'A5', before returning to the first monogram for groups A6-A10. Removing these small distinctions may negate Kritt's chronological progression, but it surely puts us on a sounder footing by treating coins with the same portrait style and monogram together.

Gold and silver

In his own organisation of Euthydemus I's precious metal coinage Kritt identified a number of master portrait models that he assumed were created centrally and then sent out to the various mints.[269] He envisaged a similar process under the Diodotids. For Euthydemus, Kritt refers to four different models, organised by the apparent age of the king in the portrait: young, middle-aged, or aged. As can be seen by the image below (**fig. 26**), taken from Kritt's plates, it is unclear what constitutes the difference between 'young' and 'middle-aged'; it is hard to identify any features of those portrait models that indicate a difference in age. The so-called 'aged' model, however, does look clearly different from the previous models in Kritt's scheme, although 'naturalistic' is a better term for this group since the idealised features of earlier models are gone, while the portrait becomes that of a particular individual, a distinction that does not necessarily indicate an ageing process, simply the use of different models, as Kritt himself suggested. Since the earlier group of portrait models shows an idealised image of the king, it is not possible to pair this with a realistic portrait and claim that the king has grown older!

Kritt identified shared features between certain portraits that suggest a single model (**fig. 26**). Portrait Model 1 is distinguished by a consistent appearance of the hair, particularly over the forehead with the locks curving downward. The lack of distinction between 'young' portraits and those identified as 'middle-aged' is again apparent in the illustration below since Kritt labels Model 1 as being used for both

[269] Kritt (2001), 73-79.

depictions, the distinguishing feature of 'middle age' being the jaw line, which has been 'expanded to indicate a fleshing out in middle age'.[270] If anything, the major difference is in the first row of the king's hair above his forehead, which is engraved with fewer distinct curves, appearing in more regular rows on the 'middle-aged' portraits. It is quite likely that the same model was used for these two different groups, but there is no evidence of an attempt to show the king ageing in his portrait. The so-called 'middle-aged' portraits are instead much more likely simply to be the work of a different engraver, or group of engravers, working from the original portrait model.

Model 2 is again distinguished by the parallel rows of locks over the forehead, although the coins attributed to this model show much greater variations in style than those of Model 1, with the king's face, in particular, being engraved in very different ways. Again, Kritt suggests a deliberate attempt at depicting the passing of time: 'this model has a tall, large face with heavy jowl, clearly intended to represent an older man'.[271] The next, Model 3, is clearly derivative of the previous one, with evidence of the same engravers at work (see Group 5 in **fig. 26**). The difference, however, comes once again in the engraving of the locks of hair above the king's forehead. On these coins they are stylised into a series of semi-circles.

Finally, we come to Portrait Model 4, which is very different from the earlier models. This is the only model to show a naturalistic image of the king, with uneven skin and pronounced jowls. The switch to this style of portraiture after the earlier models is a dramatic change, and one for which there is no clear explanation. We must assume, given the naturalistic features of the portrait, that this was an accurate depiction of the king, perhaps designed to appeal to the soldiers who were both familiar with his appearance and important recipients of the coins.

[270] Kritt (2001), 75.
[271] Kritt (2001), 75.

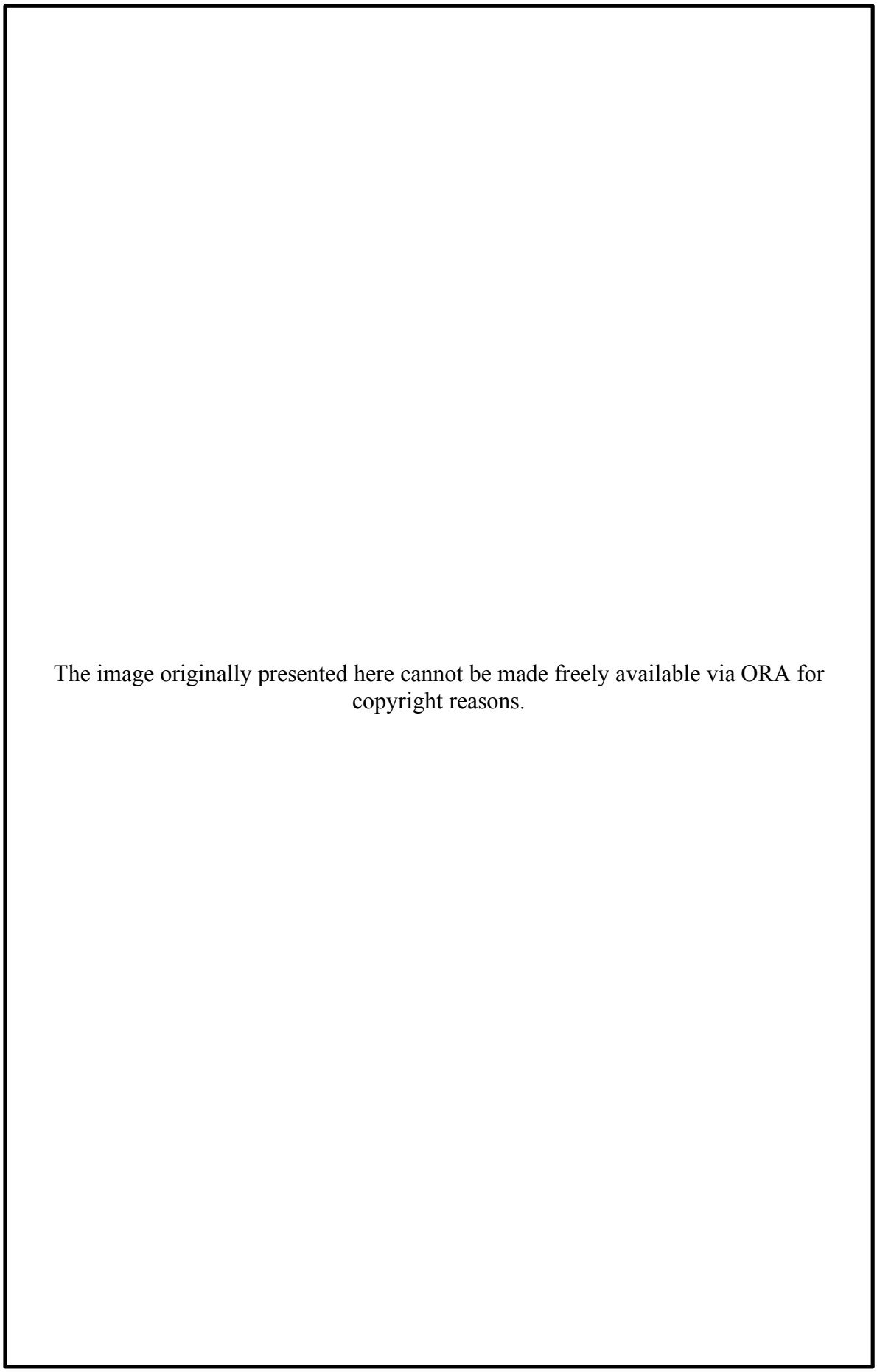
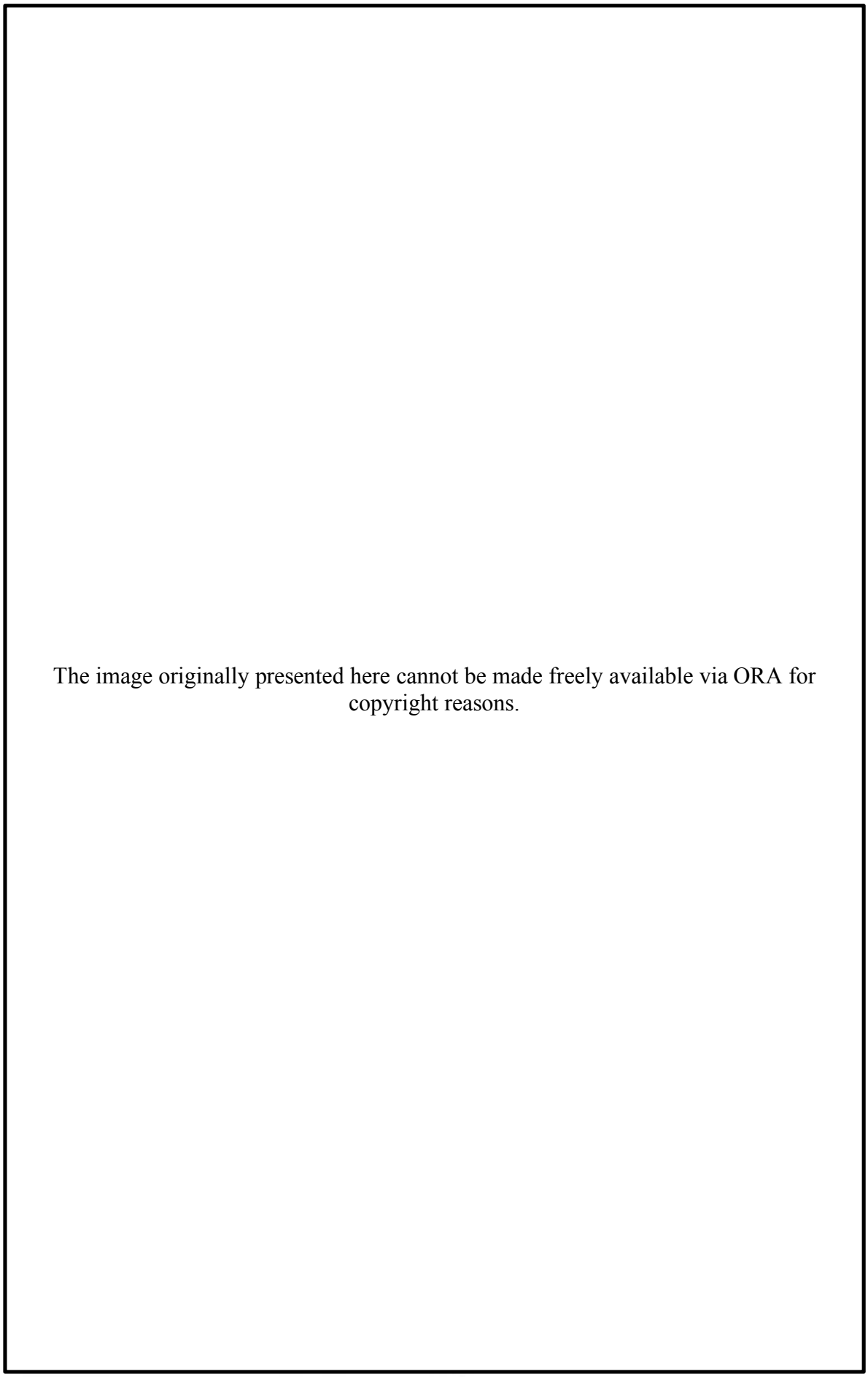


Figure 26: Euthydemus I portrait models (Kritt, 2001, Plate 15).


The image originally presented here cannot be made freely available via ORA for copyright reasons.

Mint A

As already mentioned, Kritt's organisation of the coinage often sub-divides groups on the basis of minor differences. I have preferred, as elsewhere in the study, to group the coins primarily by monogram, while also taking the obverse portrait style into account. The coins of Euthydemus I are unusual among the emissions of the six kings in this study in their use of a six o'clock die axis in addition to the usual twelve o'clock arrangement, which was to become the standard for Graeco-Bactrian coins. This difference has clear chronological implications, and the switch to twelve o'clock seems to have taken place early in Euthydemus' reign, or at least early in his output of coins.

At the beginning of each section a table is presented, as below, with the basic figures from the tetradrachm die study. This gives the number of coins of each group (n), as well as the number of obverse dies that have been identified in the study (d_O) and the n/d_O value. The final column is the estimate of the original number of obverse dies used in the striking of each group calculated with Esty's 2011 formula. The illustrations in each section are of all of the obverse dies identified for each particular group and, at a glance, give an indication of the obverse portrait model in use as well as the number of obverse dies and therefore an impression of the overall size of each group.

Table 6: Euthydemus I tetradrachm Mint A Groups I-III die statistics.

Group (Kritt numbering)	n	d_o	n/d_o	D_O
Group I (A1-A10)	132	36	3.7	49.5
Group II (A11-A14)	99	28	3.5	39.0
Group III (A16, A17)	40	10	4	13.3

For mint A it is clear that the samples of each group are good, with 3.5 being the lowest n/d_O, while the numbers of obverse dies for the first two groups is roughly similar, but Group III seems to have involved fewer dies, with ten identified in the current study.

Group I (A1-A10)  , , + TI, +AN, + A, +N

The first group in the organisation of the precious metal coins consists of one main monogram (), which appears with two additional letters separately (A and N) on some coins, as well as , + TI, and +AN, which all appear on a small number of dies. The first of these marks () appears on Diodotid tetradrachms with the name 'Antiochus', which Holt assigned to his Mint A and attributed to Diodotus I.[272] In Jakobsson's new model of the coinage, these issues, still produced at Mint A would come towards the end of the Diodotid dynasty since they were struck under 'Antiochus'. The latter explanation fits the evidence better here, suggesting, once again, some continuation between the issues of the last Diodotid king and those of Euthydemus I. Once the monogram connection has been established it is simply a case of looking at the style of the obverse portraits of the coins of these monograms to see that they should be placed together. All the obverse images of the king are clearly similar with the diagnostic feature of Portrait Model 1, the curved locks on the king's forehead very well-defined (**fig. 27**).

[272] Holt (1999), A6; C1a; C1.

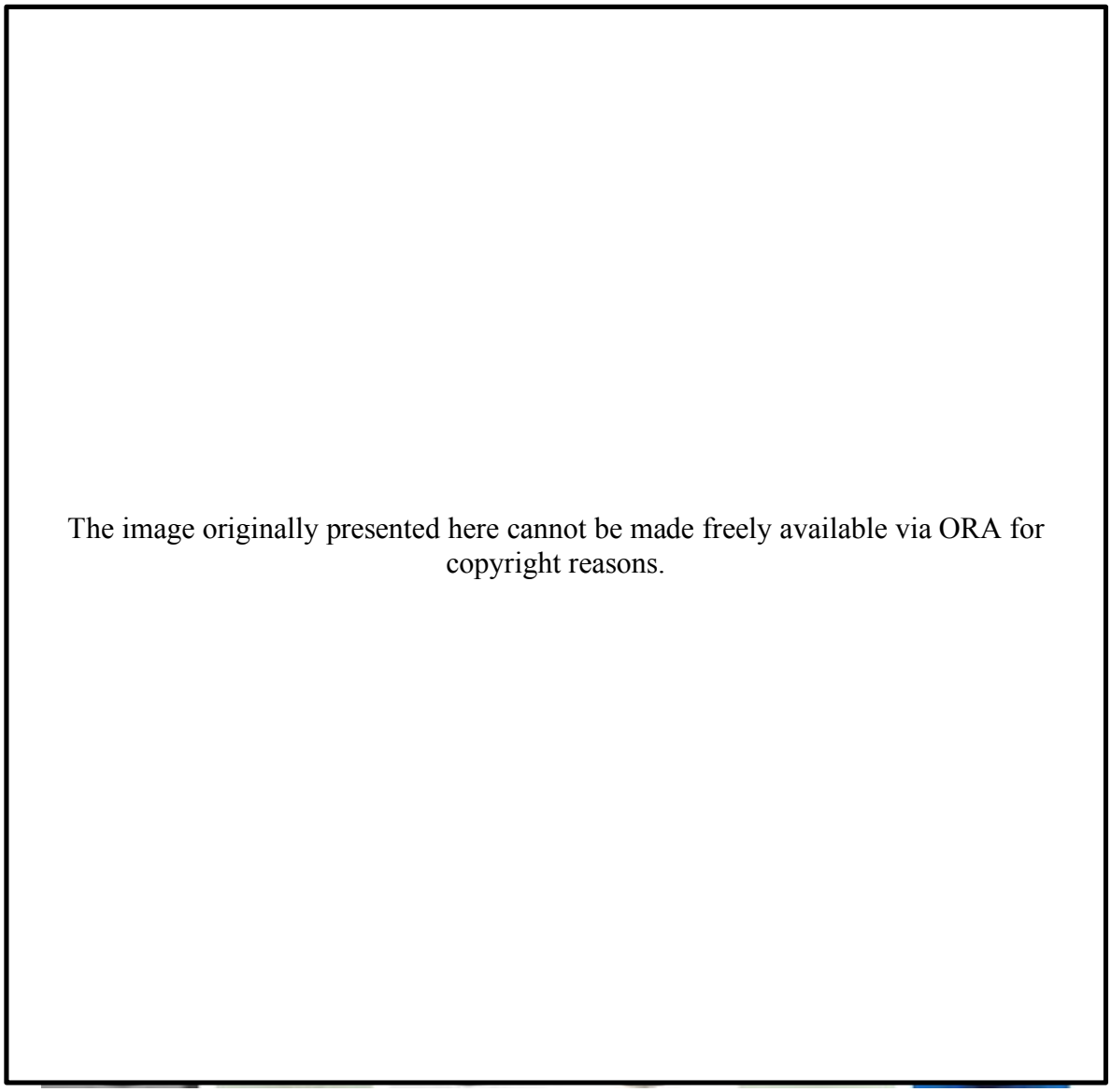


Figure 27: Obverse Euthydemus I tetradrachm dies of Mint A Group I.

Kritt identified a chronological progression on the basis of die axis since only one of his sub-groups (A1) with the monogram ⏄ has a six o'clock position; all other coins in this group have a twelve o'clock alignment. The reverse depiction of Heracles on the coins of A1 is also different, with his right foot supported by two clearly distinct rocks, while on later coins, it is shown resting on the same single group supporting the hero.

The appearance of letters on the reverse of the coins, in addition to the monograms, is a distinct feature of this group. It is difficult to distinguish differences on the basis of the coins alone that might provide an insight into the function of these additional marks. The portrait model remains the same throughout the group and the reverse image of Heracles differs only in minor details. The main difference is

the number of examples of each group. Of the 132 tetradrachms in Group I, 105 (82%) have the monogram on the reverse. Nine coins with and the letter A are included, while only two coins of are present, the remainder having no monogram or one that is illegible. During the study it has often been difficult to distinguish between the latter two groups, although the simple existence of tetradrachms without a monogram is very interesting and a unique feature of Euthydemus' coinage in this study and one to which we shall return later in discussing the output of Mint B.

The meaning of the additional letters on the coins is still unclear, but the evidence of the die study suggests that they were used on the coins for shorter periods of time than the main monogram. This insight is not conclusive, but as we shall see later, it does help to eliminate some of the hypotheses that have been suggested for the interpretation of the monograms.

Within this early group of coins from Mint A drachms and hemidrachms were also struck using the same portrait model, but surprisingly omitting the main monogram (), instead using , sometimes with an additional A. Only five drachms of this type appear in the die study, with four obverse dies identified, a sample which is too incomplete to provide much scope for analysis. It is simply interesting to note here that the minting of fractions seems to have been integrated into the striking of tetradrachms, although the lower denomination coins were probably produced in much smaller numbers.

<u>Group II (A11-A14)</u> , N, A

The next group of coins assigned to Mint A consists only of tetradrachms. These issues have a different obverse portrait style, the second in Kritt's series of models. They are noticeably different from the previous group, with a longer face and more schematic engraving of the hair. The only monogram to appear in this group is , although on some coins either N or A is added to the reverse in addition to the monogram. Once more the appearance of the additional letters has no corresponding change in either the obverse or reverse type. In fact, in this group one obverse die (O9) is linked to reverses with just as well as an example with

N. As we shall see later in the study, die links between coins with different monograms are very rarely found. The existence of a link here is strong evidence again that the additional letter did not have the same meaning as the monogram. There was probably no break in production between coins with the simple monogram and those with the additional letter N, suggesting that the letter had less to do with personnel at the mint, and perhaps was something of a more mundane administrative nature that would have been an important factor in checking the quality of the coinage. One of the most favourable explanations here is that the additional letter may have referred to a batch of metal, allowing it to be tracked after the coins had been struck. In terms of numbers of coins with the different marks, here 65 coins carry the simple ⏄ in Group II, with 28 having ⏄ N and only 3

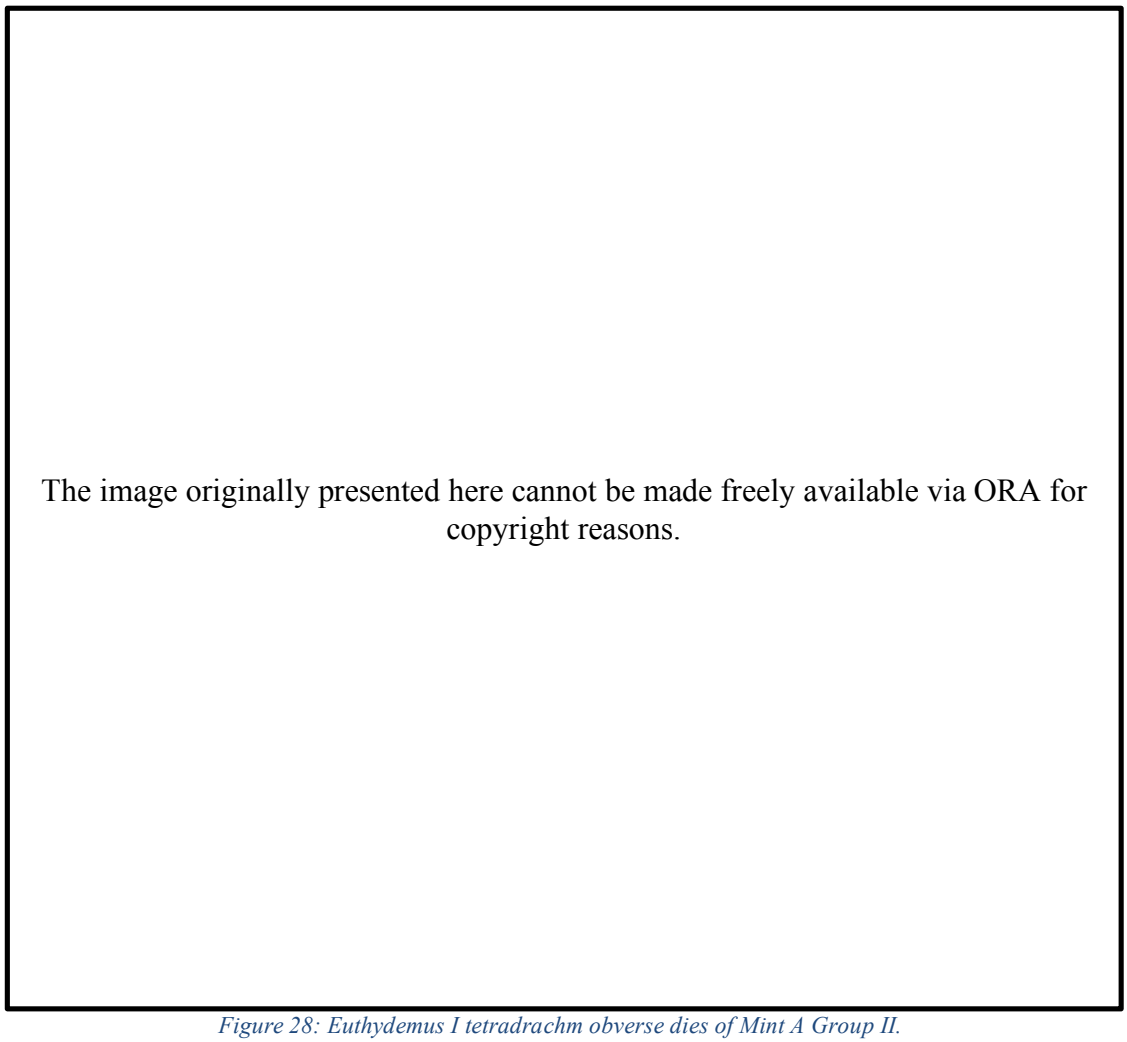


Figure 28: Euthydemus I tetradrachm obverse dies of Mint A Group II.

A chronological progression is also visible in this group. The last subdivision in Kritt's arrangement (A14) features coins with the simple monogram ⏄ and a reverse

type in which the pile of rocks on which Heracles is seated has taken on a shape more recognisable as that of a seat, but without the lion skin draped over it, a feature which appears on later examples. These coins also have a dotted border around the reverse type, a feature which is absent from some of the earlier coins in the group (A13), but reappears on later issues with the aged portrait model. Kritt identified these features as transitional ones between this group and the later issues of Mint A.[273] The current die study has confirmed this suggestion with the identification of a reverse die link between a coin of Group II and Group III (**fig. 29**).

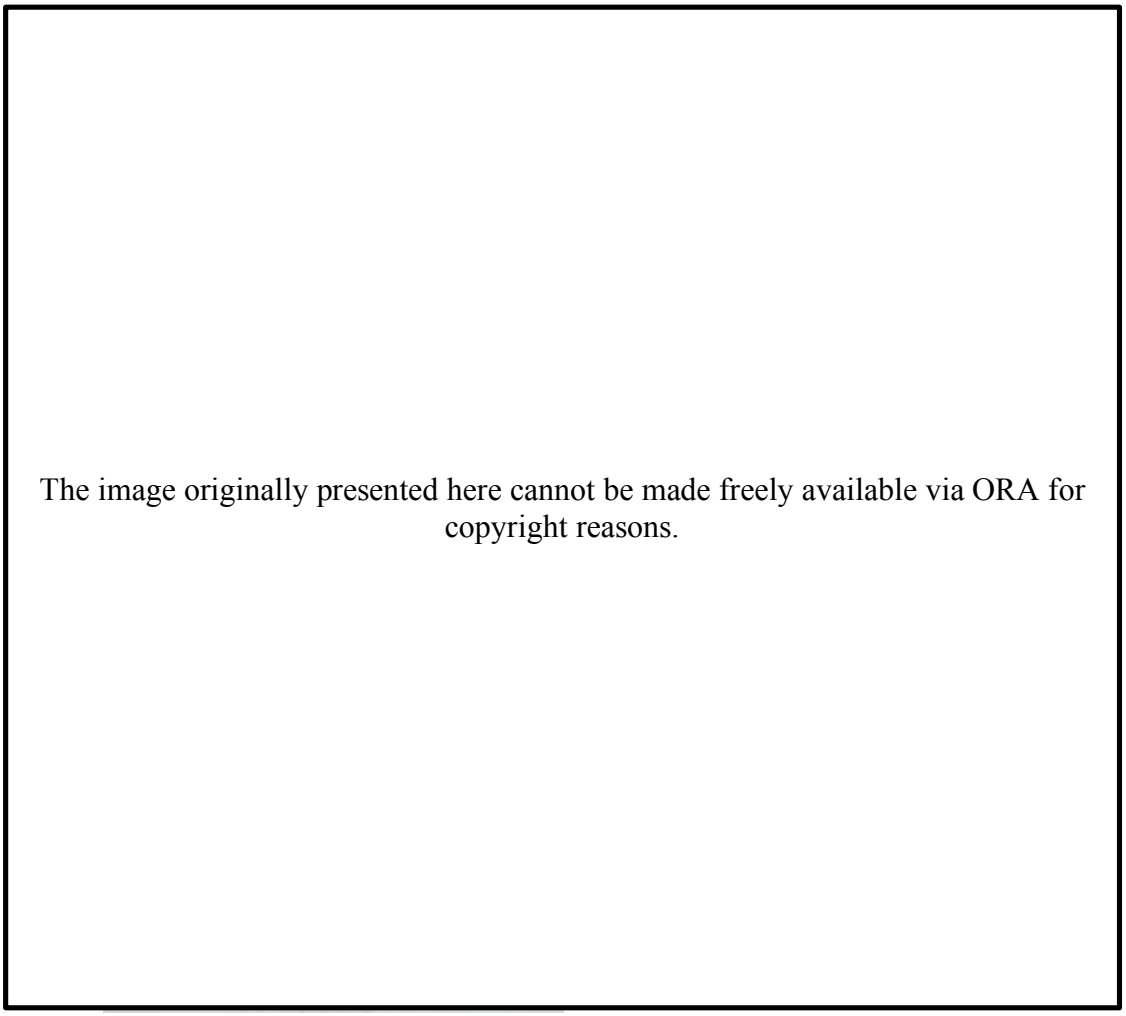


Figure 29: Euthydemus I tetradrachms, coins 348 (top) and 328 (bottom) showing reverse die link (R263) and therefore the transitional link between portrait models at Mint A.

The two obverses of the coins clearly have different portrait models, while the reverses were struck with the same die. One of the most striking similarities between the reverse is the position of the first epsilon of the king's name in relation to the dotted border. The intersection of legend and border like this is very

[273] Kritt (2001), 88.

distinctive and is rarely found on Graeco-Bactrian coins. This die link is incontrovertible evidence of the order of these emissions and indicates Kritt was correct to label them as 'transitional'.

Group III (A16, A17)

The next group is also to be considered 'transitional' although this was a term that had been applied in earlier discussions of Euthydemus' coinage. In particular Holt used the evidence of the third Aï Khanum hoard to suggest that the coins of this group were a middle stage between the earlier issues and those with the realistic 'aged' portrait. There is a clear move here to the fourth of Kritt's portrait models with the naturalistic depiction of the king. The reverse is clearly linked to the coins of the previous group, not only through the shared die illustrated above, but also by the dotted reverse border and the depiction of Heracles who is shown seated on the throne-like group of rocks, although the lion skin which appears on later coins is not present.

The coins in this transitional group, however, have some slight differences from the later 'aged' issues. The king's diadem, in particular, is engraved in a different way on these coins from its depiction on examples from other groups: one end falls straight down behind the king's neck, while the other turns 180 degrees and runs up a short distance behind the head.

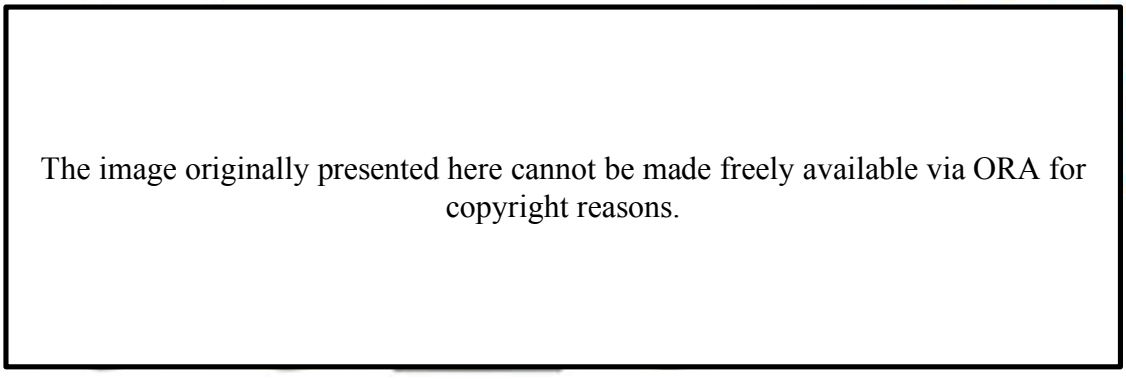


Figure 30: Euthydemus I tetradrachm obverse dies of Mint A Group III.

Gold octodrachm - A15 ()

One of the most remarkable of the coins produced under Euthydemus is the gold octodrachm acquired in the late 1960s by the Cabinet des Médailles. The coin

weighs 32.73g and was apparently found in north eastern Iran.[274] The monogram () clearly indicates the coin was a product of Mint A, while the portrait model and style is very similar to that of the tetradrachms of Kritt's groups A16 and A17. One feature of the octodrachm, however, the addition of the lion skin on top of the rocks on which Heracles is seated on the reverse provides a link to the later 'aged' issues of Mint B. This mixture of features clearly places the octodrachm between two different groups of coins. The octodrachm was identified by Holt as 'a chronological hinge' between what he saw as two different phases in the coinage.[275] Holt attributed the octodrachm to what is the only known historical event in Euthydemus' reign, the siege of Bactra, suggesting it had been struck to commemorate the end of the siege and the treaty with Antiochus. This conclusion was accepted by Kritt who supplied evidence from his study of the coinage to support it. He suggested that the coin was struck at Mint A (surely correct, given the monogram), but the reverse die was engraved from a different model, which was used at Mint B. Such a conclusion is highly likely, although Kritt then used this evidence in an overly enthusiastic fashion. He inferred that the only political condition in Bactria in which it would have been safe, or possible, to transfer a model from Mint B, which he identified as Bactra, would have been after the lifting of the siege. This, unfortunately, is one of the greatest dangers in the study of these coinages. Since so few historical events are known from the period it is very tempting to link extraordinary issues or features to them. If we consider the gold octodrachm a commemorative piece, there may have been many occasions throughout Euthydemus' reign when such a celebratory issue could have been produced, if it is even correct to think of a large denomination gold coin as a commemorative issue. It is simply an exceptional coin, which seems to have been struck as part of the final emissions of Mint A.

[274] Le Rider (1969), 26.
[275] Holt (1981), 131.

Mint B

We turn now to Mint B. Once more the early coins of this mint are clearly linked to Diodotid issues, beginning with the staters.

Gold staters - Groups I to III (B1, B4, B5, B11)  ,  , 

Figure 31: Gold stater of Euthydemus I, 8.25g (Ashmolean, Hollis collection).

The gold staters have long been recognised as among the earliest of Euthydemus' issues. Bivar placed them first in his reconstruction since gold coins were struck by Euthydemus' predecessors, and only by his successors on very rare occasions.[276] In addition he cited the 'close resemblance' of the obverse portrait to that of the later coins of Diodotus, a feature that Bivar suggested may have indicated dies used under both kings. Such a phenomenon has recently been confirmed by Zeng's discovery of die links between gold 'Antiochus' staters and those of Euthydemus. Without a more extensive study the die links between the coins of Euthydemus and 'Antiochus' are limited to staters that have recently appeared on the market and are supposedly from the hoard found in Bihar state in India.[277] The coins that are die-linked all appeared on the market from 1999 onwards and are not linked to other coins that have a provenance before this point. In fact, of the Euthydemus coins in the current study (nos 6, 7, 10, and 11), only one die combination is present, with

[276] Bivar (1951), 24. Of the following Graeco-Bactrian kings only Eucratides I struck gold coins.

[277] Zeng (2013), 75-77. Die links identified between 'Antiochus' staters (pl. 16, nos 1 and 2) and Euthydemus (pl.16, nos 3-6). The 'Antiochus' staters are Künker 226, 11th March 2013, 619 and CNG 84, 5th May 2010, 783.

neither die linked to any others. Such a die group is not unusual, but may cause some concerns of authenticity in the circumstances, since it is an extremely unusual pattern. Stylistically the coins with this die combination (O2 R6) are not obviously modern, although a small number of the features are quite different from coins with an older provenance. In particular, the pointed chin of the royal portrait on O2 is distinctly inelegant and out of place, as is the image of Heracles on R6, which does not fill as much of the surface of the coin between the two words of the legend as on other dies.

The shared die (R6) also has a very unusual flaw in the lower right field adjacent to the omega of the legend. This imprint is visible on all four coins struck with R6 and appears to be the result of a part of the surface of the die peeling back. Such a feature is exceptional and is not found on any of the other coins gathered over the course of this study. Coupled with the fact that the dies (O2 and R6) used to strike these coins are known only from this combination on the four coins in the study, it is not unreasonable to be suspicious of these coins.[278]

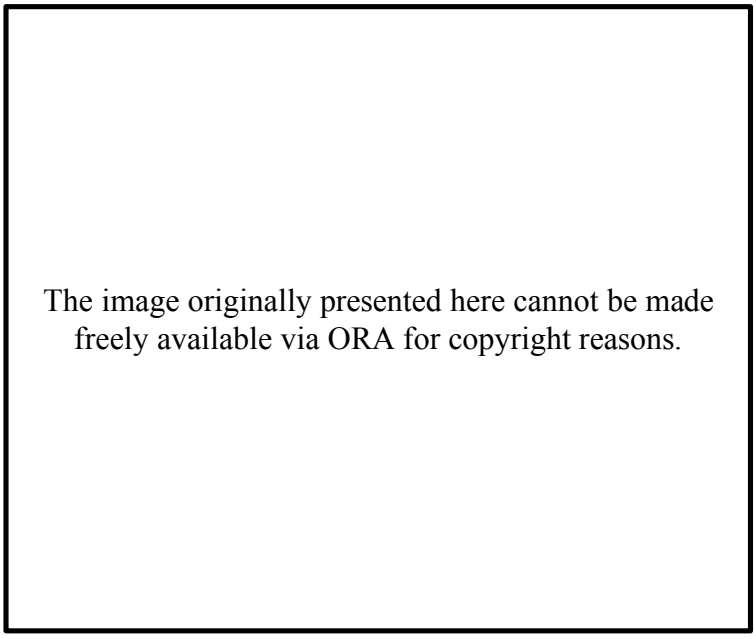


Figure 32: Reverse of Euthydemus I stater, coin 6 (Künker 216, 8th October 2012, 546).Note die flaw in lower right field.

[278] It should also be noted that a number of Diodotus staters were offered for sale in the 2000s, which were clear fakes. Indeed, some were even listed as modern copies (e.g. Noble Numismatics 91, 21st June 2009, 3369). The same modern workshop that produced these coins is likely also to have made rarer (and more valuable) Euthydemus staters.

It is to be hoped that further die links can be found between the staters, and perhaps the tetradrachms of 'Antiochus' and Euthydemus, discoveries that would surely confirm the existence of a third Diodotid. Although there may be reason to be suspicious about the die link cited by Zeng the style of the obverse portrait of the Euthydemus staters and some of his tetradrachms is very close to that which appears on the coins of the Diodotids. These coins then, surely should be placed at the beginning of his reign with the similarity explained by the use of the same minting system and the same die engravers. Two different monograms appear on the staters:  and  . The first control mark is also found on gold staters with the 'Diodotus' legend.[279] The early coins of Mint B (those preceding the tetradrachms of Group IV) all share the six o'clock die axis found on the Diodotid issues as well as the very first Euthydemus coins struck at Mint A. It is the shared monogram, die axis, and fabric of the coins that suggest that these issues are to be attributed to Mint B on the basis of their continuity with the earlier Diodotid examples.

The table below shows the different figures for the staters. For Groups I and II the output seems to have been consistent, with the use of three obverse dies. Unfortunately, with only two coins from Group III, it is not possible to come to a judgement about the original size of that group.

Table 7: Euthydemus I staters die statistics.

Group	n	d_o	n/d_o	D_O
Group I (B1)	6	2	3	3
Group II (B4, B5)	9	2	4.5	2.6
Group III (B11)	2	1	2	n/a

Tetradrachms

The table below shows the number of coins, dies, and the n/d value for the different tetradrachm groups assigned to Mint B. Again, sample sizes are good, with the exception of the first group, which is poorly represented with an n/d of only 1.3. The following two groups (Groups IV and V) are of a similar size, with 22 and 29 obverse

[279] Holt (1999), Mint B, F8.

dies identified respectively. The final group (Kritt's B17) has been sub-divided (Groups VI and VII) for the current study on the basis of the obverse portrait style. Here, again, the representation is good with n/d of 4.2 and 5.

Table 8: Euthydemus I Mint B tetradrachm die statistics.

Group	n	d_o	n/d_o	Do
Group I (B2, B7, B9)	5	4	1.3	n/a
Group II (CR1-CR3)	27	9	3	13.5
Group III (CR4)	28	6	4.7	7.6
Group IV (B13)	73	22	3.3	31.5
Group V (B14, B15)	99	29	3.4	41.0
Group VI (B17)	46	11	4.2	14.5
Group VII (B17)	104	21	5	26.3

Group I (B2, B7, B9, B12) 

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Figure 33: Euthydemus I tetradrachm obverse dies of Mint B Group I.

The tetradrachms of Group I have the six o'clock die axis and an obverse style that is derived from Kritt's Portrait Model 1, with the diagnostic depiction of the curls of hair over the forehead (**fig. 33**). Although on these coins each lock is less distinct than the issues of Mint A, it is highly likely that they were engraved using the same model. The same monograms found on the staters are also those that appear on the tetradrachms of this group. The basis of Kritt's subdivision of the group was his identification of some of the portraits as 'young' and others as 'middle-aged' although he attributed both to the same master model. Such a division is unnecessary and it is best to leave these coins as a single group, with monograms

that seem to be derivatives of each other, with only minor variations in their shapes. As mentioned above, the coins of this group are poorly represented in the study, both in terms of absolute numbers (5) and also obverse dies (4). With such a small sample it is impossible to say whether this was a small group of coins originally, or whether it has simply been badly preserved in the extant coinage.

Drachms – B3, B6, B8, B10 (,)

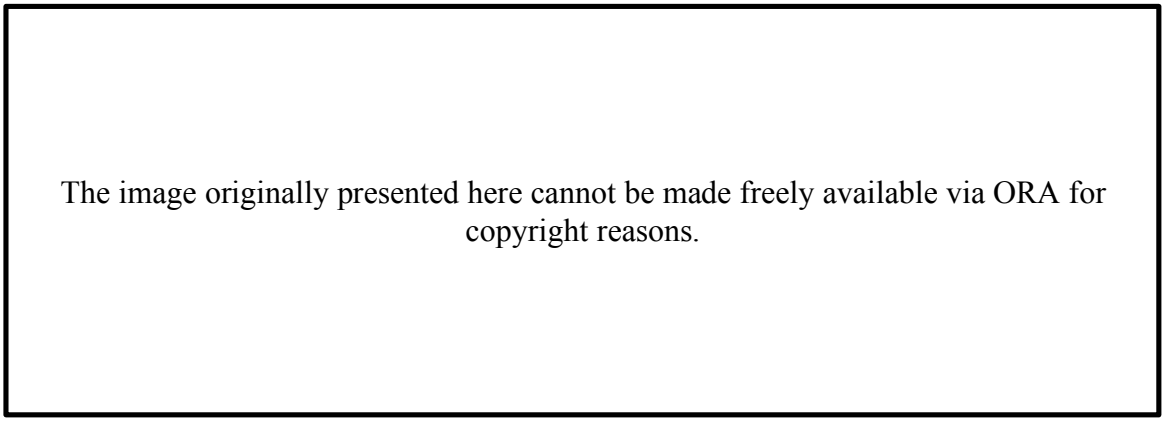
The group of tetradrachm issues of the early stage of Mint B was accompanied by an output of drachms. Die linking provides little insight into the size or organisation of these issues because of the small number of coins and links identified. The variation in the styles identified by Kritt, as well as the two monograms used, suggests that drachms were not produced as occasional small issues, but were regularly part of the mint's output, at least in this early stage.

Reattributing 'Mint C'

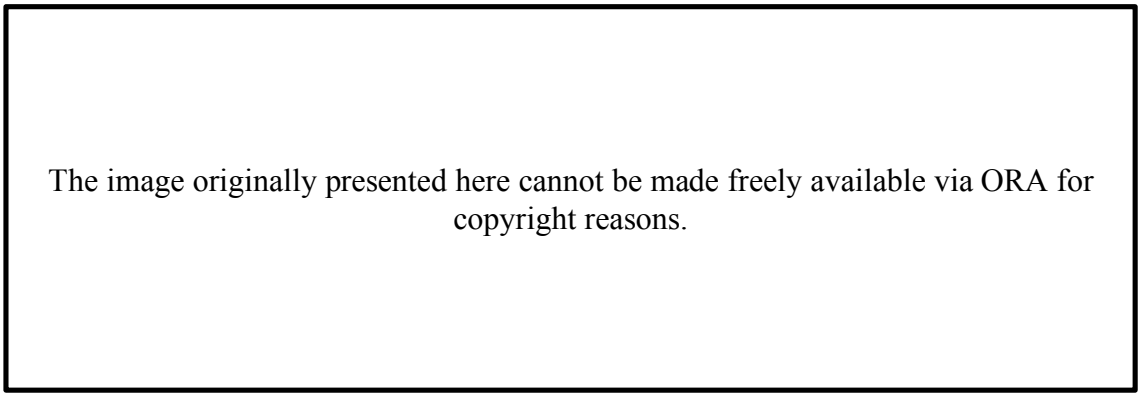
Kritt's organisation of Euthydemus' precious metal coinage includes a third mint, C, which seems to have had a much smaller output than the other two mints. Since its initial publication, Kritt has revised his organisation of Mint C.[280] This arrangement is the one given here with 'CR' numbers. As we shall see, die links between the groups corroborate this new scheme, but not necessarily its attribution to a separate mint. Since the die links make it clear that the coins were produced together, I have combined the first three of Kritt's groups, which all share a similar obverse portrait style, as well as monograms.

[280] Kritt (2015), 56.

Group II (CR1-CR3) 𐤀, 𐤁



Group II has a distinctive appearance with the idealised portrait model of the king being the basis of the obverse depiction. It is not particularly clear, however, which model was used. Some of the coins share the distinctive curled locks of the Portrait Model 1, while others have the stylised locks on the forehead which are the main feature of Model 3. All of the coins of this group have a shorter face and I prefer to identify the model as Portrait Model 1. Kritt was uncertain about which of his models was used, assigning the coins of his CR1 group to the first portrait model, with a tentative question mark, while CR2 and CR3 were assumed to have been engraved from the third portrait model on the basis of the stylised hair.



The die links identified in this study are particularly important here and provide new information on this group. I have included nine coins in Group II with the 𐤀 monogram. This symbol does not appear elsewhere on tetradrachms, but is to be found on the gold staters struck at Mint B. Kritt included coins with this monogram in his arrangement as B12, although he seems to have been aware of only a few examples and the coin with which the group is illustrated is very poorly

preserved.[281] These coins should be shifted to my Group II (CR1-CR3) on the basis of the die link illustrated below.

The die study contains five coins struck with O105, four of which have the monogram (two are illustrated in **fig. 35**: C292 and C321). The fifth coin, however, has on its reverse. This die link suggests that the and coins were struck at the same mint within a short period of time. Since the first of those two monograms is found on gold staters struck at Mint B these coins should all be assigned to that mint, and 'Mint C' deleted.

Group III (CR4)

The next group was also assigned by Kritt to his Mint C and once again features a very distinctive obverse portrait, one quite unlike that which appears on any of the other Euthydemus issues (**fig. 36**). The hair, in particular, is engraved in a very different way from the other portraits, with the locks of hair shown as much smaller lines on the head and with no sign of the regular rows that are found on some other types. On the basis of the forehead locks, his usual diagnostic feature, Kritt suggested that these coins were engraved using his Portrait Model 2. These coins are perhaps instead to be seen as another transitional group, in which the model has moved away from the idealised appearance of the early coins, but has not yet taken on the realism of the later issues of Mint B.

Group IV (B13)

The coins of the next group have a clearly different obverse style, which Kritt attributed to the use of a different portrait model, number 2 in his scheme (**fig. 37**). The die axis has now changed to twelve o'clock, an alignment that would be retained at Mint B throughout the rest of Euthydemus' reign. In addition to these

[281] Kritt (2001), 142.

differences the monogram that appears on the coins has also changed to 𐅃, another feature that would remain, with the same symbol appearing on the coins of Demetrius I and later kings.

This group consists of 22 obverse dies, all with a very similar appearance. In particular, the diadem ties, one of which curves upwards in an identical manner on all dies, and the way in which the engraver depicted the king's hair, may suggest that the dies were all engraved by the same individual. Another common feature to which we shall return is the shape of the bone above the king's eye, with a very distinctive curve and then a noticeably deep eye socket. This way of engraving the face reappears in the following two tetradrachm groups and again is a good diagnostic feature suggesting that, although the portraits were engraved from different models, the same hand was at work.

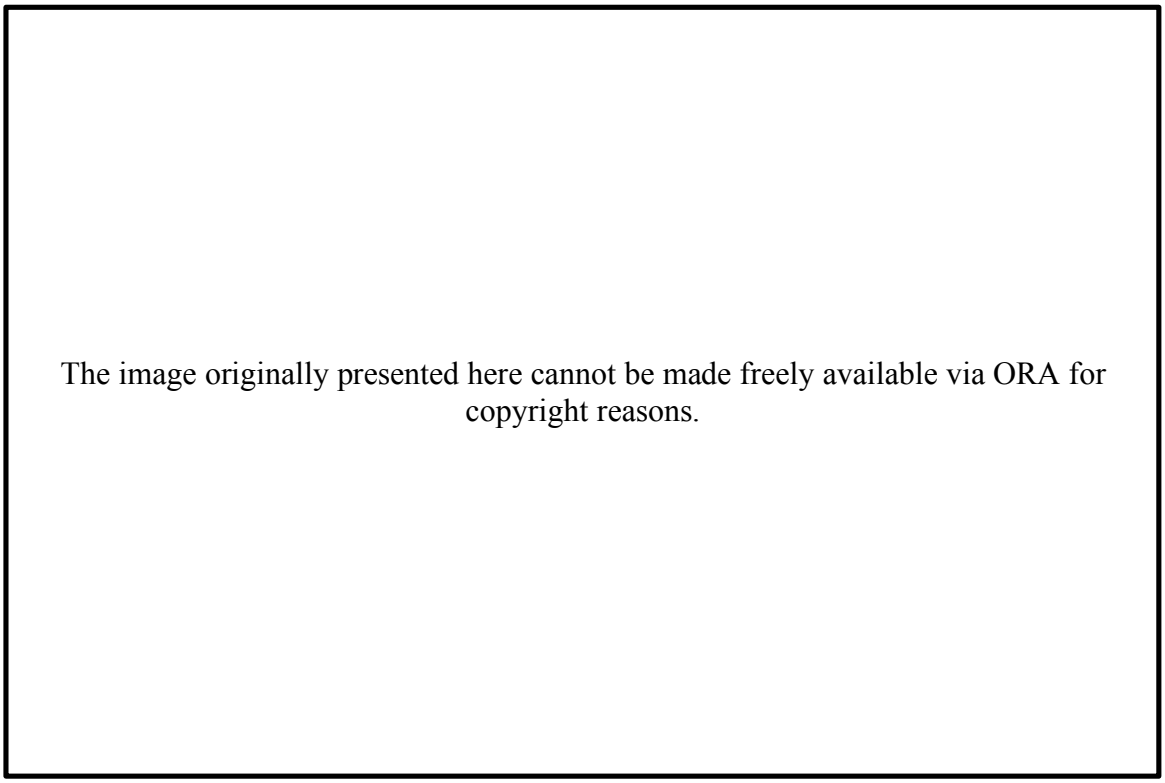


Figure 37: Euthydemus tetradrachm obverse dies of Mint B Group IV.

Group V (B14, B15) 

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Figure 38: Euthydemus I tetradrachm obverse dies of Mint B Group V.

The tetradrachms of Group V have a very similar obverse portrait to the preceding group, but here the front row of the hair is shown in a much more stylised fashion, indicating the use of Kritt's third portrait model as the basis of the image. The dies share the distinctive shape of the brow ridge with the coins of the previous group, indicating that the same engraver was employed on both. Other than the stylised locks, the coins of this group are very close to those of Group IV, with the monogram remaining the same. It is unclear what would prompt such a minor, but distinctive, change to the depiction of the first row of the king's hair, and, given that it seems likely that all coins were engraved by the same die-cutter, it is possible that the variation was simply a choice of the artist. This group also has an equivalent series of drachms, with the same monogram and clear similarities in the obverse portrait, again indicating the work of the same engraver as the tetradrachms.

Group VI (B17) 

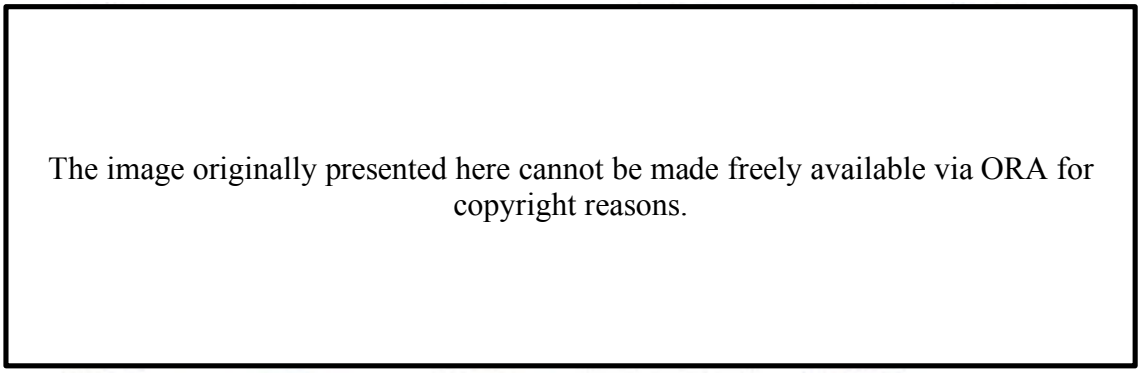


Figure 39: Euthydemus I tetradrachm obverse dies of Mint B Group VI.

The next group does not appear as a separate subdivision in Kritt's scheme, in which all of the 'aged' portraits of Mint B are grouped together in B17. As with the previous group the reverse image of Heracles now has a lion skin draped over the seat-shaped pile of rocks on which the hero is seated. This feature of the reverse type provides a clear link to the gold octodrachm struck at Mint A, as discussed above. In the current study the coins of Kritt's B17 have been divided again into two groups. Both groups have the same monogram and reverse model for the Heracles type, that with the lion skin, but the obverse portrait differs noticeably.

The model for the obverses of both groups is clearly Kritt's Portrait Model 4, the realistic depiction, which has been assumed to show an 'aged' monarch. The obverse portraits of the dies of Group VI, however, differ from those of Group VII in the prominent shape of the brow ridge, the feature that was so distinctive on the coins of groups B13-16 above. These coins were most likely engraved by the same die-cutter as the earlier coins using the same distinctive technique on the area above the king's eye, although he was working from a different portrait model. The reappearance of the work of this particular craftsman is very important in any attempt at historical reconstruction involving the coins, since it suggests that there was no significant break in the production of coins at Mint B between these groups.

Group VII (B17)

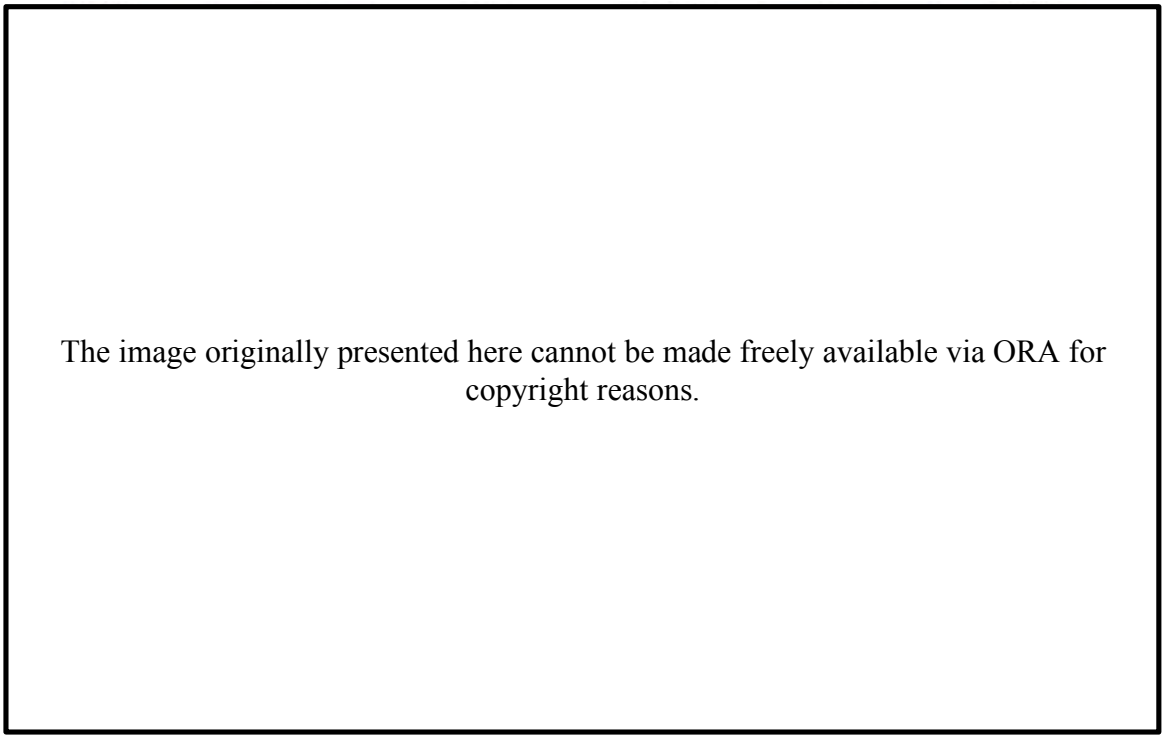


Figure 40: Euthydemus I tetradrachm obverse dies of Mint B Group VII.

We come now to the final issues of Mint B. These coins share the same Portrait Model as those of Group VI, but lack the distinctively deep brow ridge engraving style. The size of the issue is considerable, and for considerations of output group B17 should be taken as a single issue. The study has identified 32 obverse dies, making it the largest of the tetradrachms groups. Using Esty's 2011 formula the original number of dies is 40.7.

Such a large number of dies with obverses engraved from a single portrait model in a consistent way, and sharing a monogram, is quite different from the early issues of Euthydemus, and indeed, from the coinages of his Diodotid predecessors, on whose coins at least thirty different monograms and symbol combinations appear.[282]

[282] Kritt (2001), 8.

Location of mints

From the organisation of the coinage it is clear that there were two different centres of production, which until now have been referred to simply with letters. There is no clear indication of the location of either of these two mints. Holt, in his study of the Diodotid coinage, identified Mint A, and in particular the monogram  , with Aï Khanum, while Mint B, and again a monogram (), with Bactra.[283] As we shall see, the distribution of bronze coins at Aï Khanum was an important factor in the first attribution, while the war with Antiochus is cited as evidence that minting would have been impossible anywhere other than Bactra during the period in which Antiochus was active in the region. Kritt agreed with the assimilation of Mint B and Bactra, but disagreed with the identification of Aï Khanum. Although he accepted the find evidence, he pointed to the six o'clock die axis of the coins of Mint A as being different from the Seleucid coins which were identified as products of the Aï Khanum mint.[284] This led him to suggest instead that Euthydemus' Mint A should be considered as the same as a previous Seleucid 'Mint C', which had operated under Antiochus I and had used a six o'clock die axis.[285] Kritt therefore identified Mint A as 'in the region of, but not Aï Khanoum'.[286]

The truth, unfortunately, is that we do not know the location of either mint. Kritt himself accepts that the identification of Bactra was based on 'reasons of general historical likelihood'.[287] The archaeological evidence of a mint at Aï Khanum is based solely on the discovery of ten unstruck flans among the coins found during the excavations.[288] The find spots of precious metal coinage are so few as to be of no help at all, leaving the locations of the mints unknown. Throughout the study evidence suggests that these mints remained in use, but under later kings there is still no indication of their location.

[283] Holt (1999), 132.
[284] Kritt (2001), 66.
[285] Kritt (1996), 50.
[286] Kritt (2001), 135.
[287] Kritt (2001), 66.
[288] Bernard (1985), 5.

Copper

Table 9: Euthydemus I copper coinage.

Denomination	Number of examples (n)	Weight range (g)	Mean (g)	Standard deviation	n/d_O	D_O	Monograms
Copper							
AE Double	96	5.26-11.82	7.77	0.98	1.6	n/a	None  anchor ΔI
AE Unit	10	2.95-5.07	3.82	0.68	1.1	n/a	None  E
AE Half	8	1.47-2.28	1.96	0.27	n/a	n/a	None 
AE Quarter	2	0.76-0.79	0.78	0.02	n/a	>2	None

The copper coins struck under Euthydemus I fall into two distinct groups, which have long been recognised as different in many ways from the precious metal issues, making an integrated reconstruction of both coinages difficult. Bivar simply placed the bronze coins in an appendix, while noting the features that prevented easy comparison.[289] The bronze issues often have no monogram at all, and those that do appear are often different from the ones that are found on the silver and gold coins. Likewise, the change in die axis, that was so clear in the system above is not found on the bronze coins. Within the bronze series, however, there are some

Figure 41: Euthydemus I AE double unit with thick flan and bevelled edge, 8.13g (Ashmolean, J. B. Elliott 1859).

[289] Bivar (1951), 35-39.

features that allow division into different groups. Bopearachchi classified these groups as thick, bevelled flans and thin, flat flans.[290] The variation is clearly the result of a different technique used in the production of the blanks. The division is also most likely to be a chronological one, since the Diodotid bronzes as well as those struck under the Seleucids have the thick flans with a bevelled edge, a feature missing from the issues of the later Graeco-Bactrian kings. Such a distinction is very important and means that the thicker coins can be safely assumed to be the earlier issues.

Figure 42: Euthydemus I AE double unit with thin flan and straight edge, 8.58g (Ashmolean, Shortt Bequest 1975).

As we shall see throughout this study the copper coins are often much more poorly preserved than the precious metal issues. This feature made identifying the often minor differences in the engraving of the types, and therefore establishing die identity, very challenging. I have therefore been conservative in making die links, which may have resulted in a slightly lower n/d value for the base metal coinages throughout. Instead of dealing separately with denominations, some of which are very poorly represented in the study, I shall divide the bronze coins primarily on the fabric of the flans.

[290] Bopearachchi (1991), 160-163.

Thick flans (no monogram)

The distinctive fabric of these coins sets them apart from all of the copper coins issued under the later Graeco-Bactrian kings. The bevelled edge is the result of the shape of the mould used to cast the blanks; a feature presumably intended to ease removal of the flan.[291] Such a technique is found on the bronze coins struck during the reigns of the Diodotids, and is also known from Seleucid mints further west.[292] It is also to be seen on bronze coins of Antiochus III, which Kritt attributes to the Aï Khanum mint.[293]

The thick flan copper coins were struck in a number of denominations: double, unit, half, and quarter. No monograms appear on any of these coins. The types are consistent on the heavier coins, with a head of Heracles on the obverse, and a prancing horse and the usual legend on the reverse. Only on the quarter units do the reverse types vary on a very small number of extant coins, with only a horse's head, or, more surprisingly, a trident, both to fit onto the smaller flan. The obverse head of Heracles is engraved in a consistent style with a bland treatment of the face and a formulaic depiction of the hair and beard in which the individual locks are engraved in a grid pattern (see **fig. 41**).

Table 10: Euthydemus I AE thick flan die statistics.

Type	n	d_o	n/d_o
Thick flan double	60	38	1.6

The only denomination which had a suitably large number of coins to draw any meaningful conclusions from the die study was the double unit. It is impossible to say whether fewer of the smaller denomination coins were produced. It is quite likely that their poor level of representation is instead due to their low value and, in the case of the half and quarter units, their very small size. Of the coins collected for the study, the majority come from archaeological contexts or museum collections rather than commercial numismatic publications. The limited demand

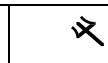
[291] Bernard (1985), 17.
[292] Le Rider (1965), 13.
[293] Kritt (1999).

for these bronze coins has led to fewer examples appearing on the market and therefore being available for study.

Thin flans (none,  ,  , anchor ΔI, E)

The thin flan bronze coins differ in a number of ways from the earlier, thicker issues. The same denominations were struck, with the exception of the quarter unit. The types remained the same, but were executed in quite a different manner, particularly the obverse image of Heracles, whose hair and beard tend to be engraved in a more naturalistic way. There are five different combinations of monograms and symbols that appear on the reverses of these coins.

Table 11: Euthydemus I AE control marks.

Denomination	No monogram			anchor ΔI	E
Thin double	24	8	1	2	
Thin unit	1	3		1	1
Thin half		1	2		

The table above shows the number of coins in the study from each denomination with the different monograms. Since it was very difficult to establish die identity for these coins it is unfortunately necessary to work with the absolute number of coins, with all its potential biases, rather than the number of dies. Bearing these problems in mind it is still clear from the table that the different monograms and symbols are not represented equally in the study. The majority of double unit coins appear with no monogram, while the other symbols are represented on so few coins it is impossible to draw a conclusion about their use. The monogram  , which was representative of a significant change in style on the precious metal coinage, reappears on these bronze issues, meaning that they should be considered as products of the same production system.

The most interesting symbol to appear on the coins is the anchor. This was a well-known symbol of the Seleucid dynasty, appearing on the coins of Seleucus I and his

successors.[294] The appearance of an unequivocally 'Seleucid' symbol was seized upon by Holt in his reconstruction of Euthydemus' coinage. Once again he saw this as a convenient connection between the coinage and the known historical events. Holt suggested that the only possible reason for the inclusion of an anchor was because Euthydemus, 'in exchange for his independence…acknowledged the nominal suzerainty of Antiochus III.' [295] Therefore it is possible to date the coins on which it appears to precisely 206 when Antiochus was in Bactria and the treaty was drawn up. According to Holt the anchor would have been removed from the coinage as soon as Antiochus had left as by that point 'there would have been no reason to make such a gesture'. It is unclear, however, how that gesture would have worked in reality. In Holt's reconstruction the mint of Euthydemus strikes a large gold octodrachm to celebrate the end of the siege of Bactra, a coin which features a novel, more realistic depiction of the Bactrian king, but no reference to his new Seleucid allies. The only coins on which any reference to the Seleucids appears are the copper double and single units. Such a change on the coins is very unlikely to have been noticed by the Seleucids, who were presumably the intended recipients of Holt's 'gesture'. In fact the anchor also appears on coins of Antiochus III which Kritt assigned to Bactria.[296] It is important here, however, that the anchor appears as a part of the type of the coin, alongside a tripod, rather than as a much smaller control mark.

The other symbols on these coins may provide a more prosaic explanation for the appearance of the anchor. An equally small number of the copper coins have a trident (𐡗) symbol on the reverse with no other symbol or monogram. This mark had appeared on earlier Diodotid bronzes, and may therefore provide some evidence of a chronological order for these issues.[297] It is important as the trident is clearly a symbol, rather than a monogram, and as such provides a precedent for the appearance of a sign that does not consist of letters. The appearance of the anchor on the bronze coins above, without any other monogram or symbol, is probably simply the appearance of a different control mark rather than any sort of gesture to the Seleucids.

[294] Mørkholm (1991), 73; Antela-Bernardez (2009).
[295] Holt (1999), 132.
[296] Kritt (2001), 153.
[297] Kritt (2001), 106.

The removal of this connection unfortunately takes away the only chronological indicator for the bronze coinage of Euthydemus. It is clear that the coins, with their two distinct fabrics, were produced in two different locations with different methods of producing the blanks, but it is not clear whether these mints were operating at different times from each other, or during the same period. This was, however, the last time that the smallest denominations of bronze coins were to be produced in the Graeco-Bactrian kingdom. Quarter and half units do not appear in the systems of coinage of the later kings, who in fact seem to have a preference for larger denominations, with triple and sextuple units struck under Euthydemus' immediate successor, Demetrius.

Summary

The coinage of Euthydemus I began as a direct continuation of that produced under the Diodotids. The output was one mainly composed of silver tetradrachms in addition to other, smaller denominations. The mints received centralised instructions, which included portrait models from which they were to produce the obverse image, as well as a model for the reverse, reflected in the variations of the presentation of Heracles. Initially, Mint A was responsible for the majority of the output, but later on production was increased at Mint B to match that of Mint A. This larger output coincided with a reform of some sort at Mint B, indicated by the change to the monogram  . It is very difficult to place a date on this change, or the others throughout the reign.

The diagram below shows the different groups struck at each mint as well as the estimated number of obverse dies used. It is possible to identify three phases in the coinage. In the first phase, Mint A was the main producer of the coinage, with both mints striking in phase two, and Mint B taking over the majority of the production in phase three. Only in the first phase were smaller silver denominations and gold staters produced. The copper coinage is more difficult to analyse and provides less information. As with the silver coinage, however, there is a major change in the copper with a move to a different, thinner fabric of the flans, which coincides with

the appearance of the  monogram. It is likely, therefore, that the copper coins were initially made at Mint A, but shifted to Mint B after the reform there.

It is possible that the reform of the silver coinage, as well as the copper issues, and drop in production at Mint A reflect the situation in the kingdom following the invasion of Antiochus and the siege of Bactra. The gold octodrachm, 'commemorative' piece was then struck on the reopening of the mint. The results of the die study do not suggest this is the case. With the invasion and siege, one would expect a sharp increase in output to account for increased military expenditure, followed by a dramatic fall in production during the siege itself. The level of production of tetradrachms remains consistent throughout the reign, although, as mentioned above, the output at each mint was not necessarily equal. It appears that the transfer of production from Mint A to Mint B was a gradual one, involving a number of different stages, and as such is more likely to have been an administrative change made in peace time for reasons that are unknown to us.

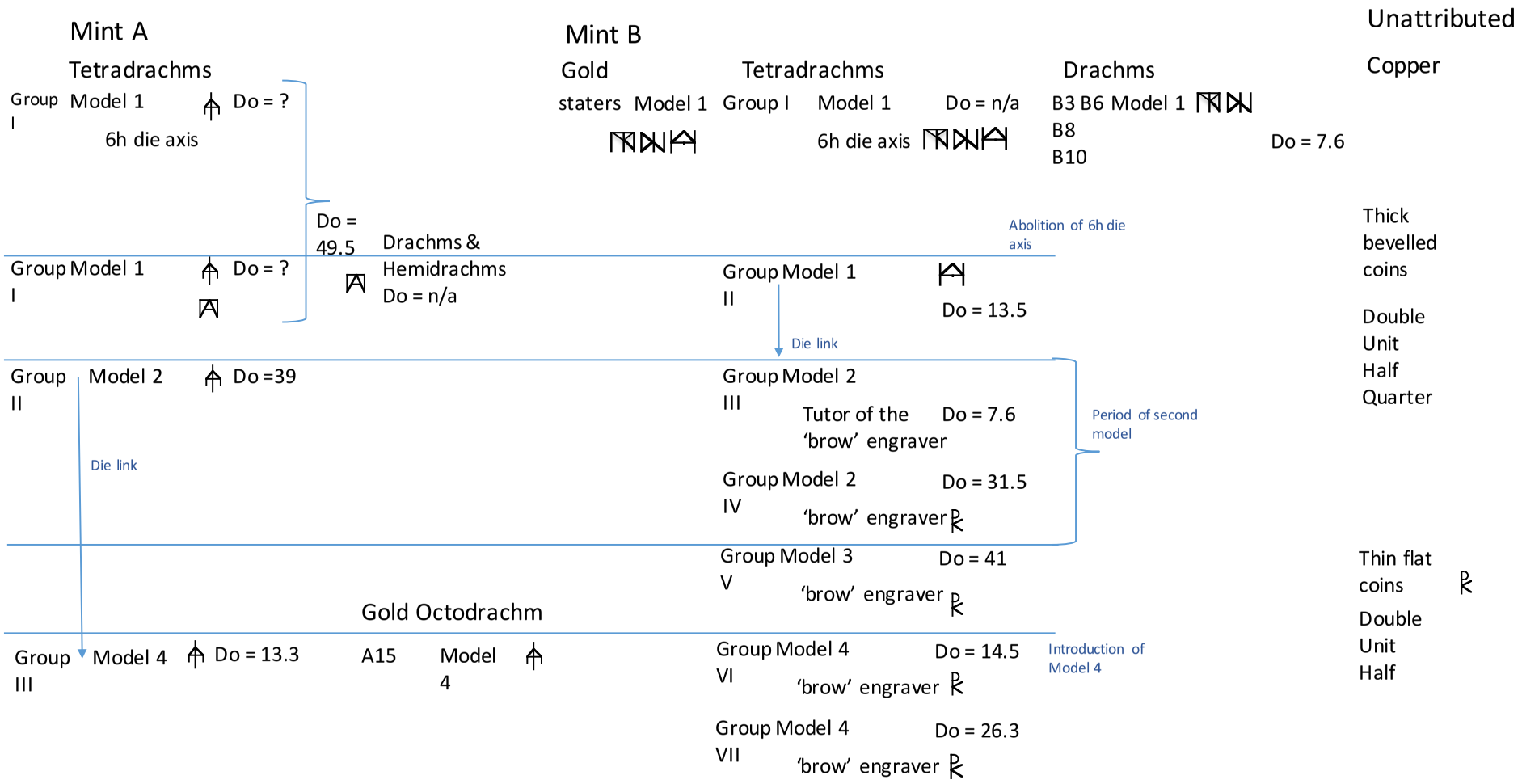


Figure 43: System of production under Euthydemus I.

Chapter V: Demetrius

As we have seen, literary and epigraphic evidence identifies Demetrius I as the son of Euthydemus I, although detail of the transition between the two is lacking. Demetrius is one of the Graeco-Bactrian and Indo-Greek kings who had homonymous successors, leading to some confusion, both in the numismatic record as well as written history.[298] Here Bopearachchi's identifications of coins of Demetrius I are followed, with coins attributed to the later kings Demetrius II and Demetrius III omitted.[299] The few literary sources we do have offer some tantalising insight. Polybius refers to him as a young man and mentions his part in agreeing a treaty with Antiochus III, which resulted in the Seleucid king offering one of his daughters in marriage to Demetrius, although we do not know whether the union actually took place. The Kuliab inscription indicates that Demetrius held an elevated royal status under his father, although he is not explicitly referred to as king, but is given an epithet referring to his conquests, a feature which is also mentioned by Strabo (II.II.I), perhaps in reference to India.

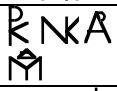
Figure 44: Tetradrachm of Demetrius I, 16.44g (Ashmolean, Hollis Collection).

[298] Seldeslachts (2004), 251.
[299] Bopearachchi (1991), 164-167. The basis of these attributions is discussed in Kraay (1981).

System of Coinage

There are a number of changes in Demetrius' system of coinage from the output of Euthydemus I, most noticeably a lack of gold staters and a change in the denominations of copper coins that were produced. No coins of a denomination smaller than the double were struck, while triple and sextuple units were added, the latter being the largest bronze denomination minted by the Graeco-Bactrian kings. The unit, half unit, and quarter unit, which were not struck after Euthydemus'  reform at Mint B do not reappear under his son.

Table 12: System of coinage under Demetrius I.

Denomination	Number of examples (n)	Weight range (g)	Mean weight (g)	Standard deviation	n/obverse dies	Estimated number of obv. dies	Monograms
Monolingual							
AR Tetradrachm	293	14.26-17.13	16.52	0.51	4.7	80.3	
AR Drachm	14	3.52-4.17	3.94	0.20	1.3	n/a	
AR Obol	82	0.46-0.86	0.66	0.05	1.7	115.8	
AE Double	72	4.26-11.88	7.56	1.06	2.1	68.1	
AE Triple	134	8.14-14.42	11.80	1.00	2.5	87.7	
AE Sextuple	10	18.61-25.69	22.98	1.99	1.4	23.3	

Gold

In recent years a small number of gold coins have been attributed to Demetrius I. Bopearachchi was the first to publish one of these coins, said to have come from the second Mir Zakah hoard.[300] Since these coins are anepigraphic the issuing authority is not clear and Bopearachchi's attribution far from certain (**fig. 45**). The obverse is said to represent a shield, although the extensions on two of the sides, above and below the main circle, cause difficulty for such an identification. The reverse, however, clearly shows a caduceus. The two other symbols on the reverse

[300] Bopearachchi (2001), 22.

pose more of a problem in their interpretation. Bopearachchi suggested that they are an iota and a lunate sigma. If they are letters they are clearly separate and not a monogram as would usually be expected. Based on the weight of this (at the time) unique specimen, which is given as 1.60g, the coin was identified as a triobol, which should weigh between 1.90g and 2.10g on the Attic standard. The discrepancy between these weights was explained by Bopearachchi with the observation that Graeco-Bactrian coins usually do not reach the theoretical Attic standard.

Figure 45: Top: Gold coin attributed to Demetrius I (CNG Auction 93, 22nd May 2013, 680). Bottom: Gold coin of uncertain attribution, 1.00g (Ashmolean, Hollis Collection).

Bopearachchi gave a very tentative attribution for the coin on the basis of the obverse and reverse types which are shared with bronze coins issued by Demetrius: the caduceus appears on the reverse of the triple unit, while the sextuple unit features a shield. He acknowledged that since there is no legend such an 'attribution to a ruler would only be a guess'.[301] One possibility not considered by Bopearachchi is that the coin types should not be linked to bronze coins of Demetrius, rather to bronze issues of the Indo-Scythian king, Maues. These later coins are clear imitations of the triple units of Demetrius, copying both the elephant head and the caduceus, but changing the legend to indicate Maues as the issuer.

Another coin of the Hollis collection, presumably of the same series, adds weight to Bopearachchi's identification. This coin shares the same 'bead and reel' border as

[301] Bopearachchi (2001), 22.

the example published by Bopearachchi, yet features two different types: a club on the obverse and a wreath on the reverse. Using a similar approach of comparing types to those that appear on coins of other metals it is very easy to draw a link to Demetrius I again. The club presumably represents Heracles, who appears both on the reverse of all denominations of Demetrius's silver, as well as on the obverse of his double unit bronze issues. In the depiction of Heracles on the silver coins the hero is shown crowning himself with a wreath, providing an obvious link to the reverse type of the gold coin.

A tentative attribution to Demetrius I is possible, but the lack of a legend makes any attribution problematic. Gold coinage is relatively rare in the output of the Graeco-Bactrian kings, although it had been struck under Demetrius' immediate predecessors. These kings produced gold staters, or larger denominations, and all made use of the usual Hellenistic arrangement of types: an image of the king on the obverse, with a deity on the reverse. They all also include a clear legend with the royal title and were struck on the Attic standard. These two coins share none of these features with the staters and octodrachms of the previous kings. Instead they are of a rather awkward weight, are noticeably smaller (with a diameter of 10mm), and feature divine attributes while showing no depiction of the king or even a legend. These coins share more similarities with a small number of gold coins attributed to Menander I (*BNBact* série 1). In any case they are not here considered issues of Demetrius I and have been omitted from further discussion.

Tetradrachms

The tetradrachms issued under Demetrius feature the well-known portrait of the king wearing the elephant scalp, an image that has been used on the cover of books as emblematic of the Greek presence in Central Asia and India.[302] Whatever the potential implications of the type, it is consistently executed across the silver denominations struck during Demetrius' reign. This consistency makes placing these coins in a chronological order very difficult since there is no use of different portrait models or development of the type and legend, simply different engraving styles. The coins have therefore been organised into groups primarily on the basis

[302] See for example Marshall (1951) and Widemann (2009).

of the monograms that appear on the reverse. The overall n/d for the tetradrachms is 4.4, a representative sample, although this number drops in certain groups to around 3. The only group with a very low figure is Group V (1.7), which is made up of only five coins struck with three different dies. Such a sample makes detailed analysis difficult, but the lower value alone may be interesting in historical terms. The estimate for the original number of obverse dies (D_O) is also of interest, clearly showing that the different groups were of unequal sizes in terms of output.

Table 13: Demetrius I tetradrachm die statistics.

Obverse Type	n	d_o	n/d_o	D_O
Group I	17	6	2.8	9.3
Group IIa	22	8	2.8	12.6
Group IIb	39	8	4.9	10.1
Group IIc	26	3	8.7	3.4
Group IId	16	3	5.3	3.7
Group IIIa	114	25	4.6	32.0
Group IIIb	49	8	6.1	9.6
Group IV	5	2	2.5	3.3
Group V	5	3	1.7	n/a
Totals	293	66	4.4	85.2

Monogram	n	d_r	n/d_r
	17	14	1.2
	102	63	1.6
	116	67	1.7
	41	30	1.4
 **bead and reel**	6	3	2
	5	2	2.5
	5	4	1.3
Illegible Monogram	1	1	1
Totals	293	184	1.6

Mint A

Group I ()

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Figure 46: Obverse dies of Demetrius Group I tetradrachms.

The coins of Group I all feature the monogram  , which was the major control mark used at Mint A under Euthydemus I. These coins must therefore be assigned to Mint A as well. In the previous chapter we saw the production of Euthydemus' coinage at that mint ended abruptly with the transitional type of the gold octodrachm, which was the only coin produced at Mint A to use Portrait Model 4, the final model used under Euthydemus. We must assume, then, that the coins of Demetrius' Group I were among the first issues of his reign, and may even have been produced at Mint A while Euthydemus' later coins were struck at Mint B.

Unlike the coins of Demetrius' later groups the style of the obverse portrait is variable. The majority of the dies in Group I, have a rougher style of depicting the king, who seems to scowl, while the corner of his eye droops, and most noticeably

the proportions of his face (from forehead to chin) are much longer, taking up more of the surface of the coin.[303]

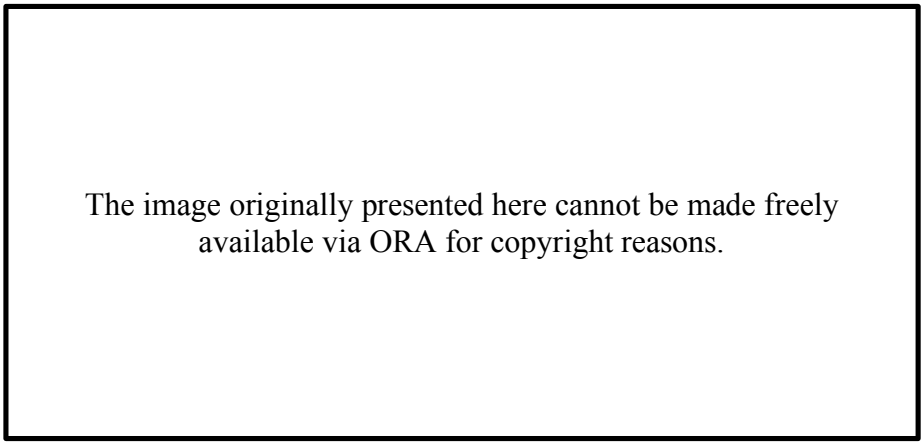

Figure 47: Transitional obverse dies of Demetrius Group I ( ) and Group IIa ( ).
Left: Künker Auction 67, 9th October 2001, 520 etc. Right: BM 1856.1106.19.

Not all of the dies of Group I share this style. Two in particular have very close stylistic links with the dies of Group IIa, on which the king's face is shorter and his mouth does not droop. One die of each group is illustrated in **fig. 47**. The similarities between the two dies are remarkable: the shape of the fluttering diadem tie, the elephant's ear and rather oddly flattened eye. There are so many valid points of comparison, even down to the locks of hair on the king's temple, that it is almost possible to identify a false die link between the two coins. The hair at the back of the king's head, as well as the depiction of the shortened elephant's trunk are, however, indications that the coins were struck with two different dies. Such close similarities between the engraving are highly unusual, particularly on coins with different monograms and therefore separated into different groups. On this basis the two dies must have been engraved by the same person. This observation gives an interesting reconstruction for the production of these coins. Elsewhere we see a definite break in production between the use of different monograms, here, however, the same artist was employed to produce two dies used with different monograms. This may indicate a much shorter break in production than usual, or simply be that this particular artist was local to the mint and available to engrave dies regularly. Whatever the case, the dies illustrated below should be considered a

[303] These features are particularly noticeable on the coin illustrated in the top left of figure 15 (Ira & Larry Goldberg, Auction 53 24th May 2009, 1711 etc.).

link between the two monograms, and the basis of the very important attribution of  to Mint A.

Group II ()

Figure 48: Obverse tetradrachm dies of Demetrius Group IIa.

The coins of Group II all have a single monogram on the reverse (). Unlike the previous group there is a significant variation in the style of the obverse portrait of these coins. This group has therefore been divided further into four subgroups on the basis of these stylistic differences.

Group IIa is characterised by the shape of the diadem (**fig. 48**). In this group one of the diadem ties runs almost directly downwards behind the king's head and back, while the other flutters first down and then back up, highlighting the presence of the royal attribute. The manner of engraving of the ear of the elephant's scalp helmet is consistent throughout, conforming to neither of the forms discussed below (**fig. 55**). Here it is something of a mixture, with the overall shape roughly triangular, but with much more detail on the underside of the ear, and a distinctive protuberance at the back. Coupled with the unusual depiction of the diadem and the pronounced brow line present on each example, this makes it highly likely that the dies of this subgroup were all produced by the same engraver.

The next group, IIb (**fig. 49**), shares many similarities with the previous one. The king's face often seems to be engraved in a similar way, with the distinctive deep

brow line clearly visible. The diadem is depicted slightly differently, with one tie running straight down behind the king's body as before, while the other is much shorter. This similarity makes it highly likely that these two subgroups were produced in a relatively short period of time by the same personnel working from the same prototype.

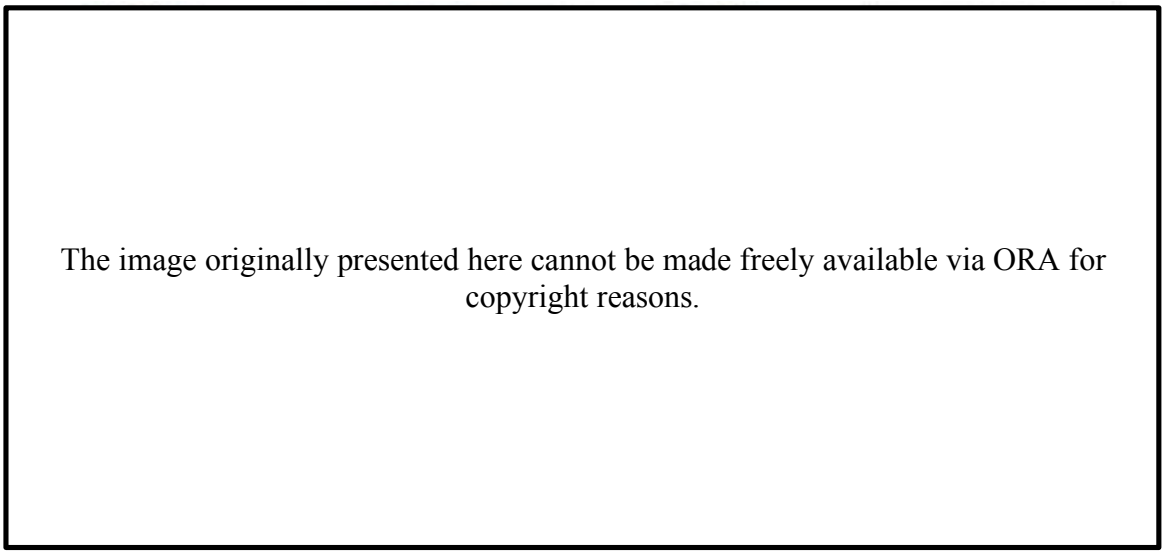

Figure 50: Obverse tetradrachm dies of Demetrius Group IIb.

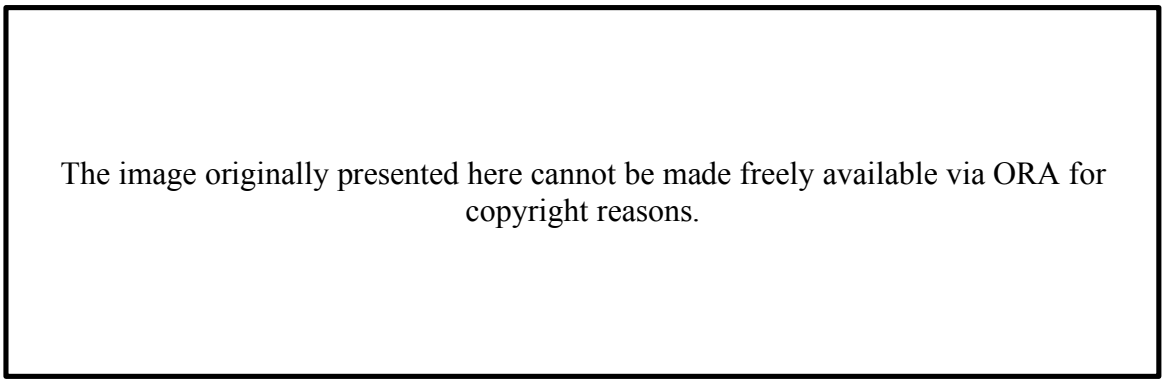

Figure 49: Obverse tetradrachm dies of Demetrius Group IIc.

Unlike the coins of the previous two subgroups those of Group IIc feature a noticeably different obverse portrait of the king (**fig. 50**). Once more the ear of the elephant scalp helmet is engraved in yet another fashion, quite different from the previous two methods, and particularly distant from the triangular conception. The eye of the elephant has also been changed in execution from that of the dies of the other groups and subgroups. On these coins it is as if the artist copied the model and failed to understand that the shape above the king's ear was in fact the elephant's eye, simply rendering it as an elongated triangle and making it into an

indistinct feature. For these reasons the coins of Group IIc were engraved by a different artist from those of the other subgroups. Facially the king seems to look much younger in the portrait on these coins than that which appears on the coins of the other groups. In particular, the king's neck is much shorter giving the impression of a smaller individual. It logically follows from this inference that the coins on which the king looks youngest were the first to have been struck at the start of his reign. Such observations are, however, ones that are more relevant to a modern audience familiar with the transmission of an image through photography. The portrait simply has slightly different features because it was engraved by different personnel or perhaps because it was based on another model, not because it accurately reflects the appearance of the king. This conclusion, along with the sharing of the monogram with coins with the different portrait style, means that there is no chronological inference to be drawn from this subgroup. The size of the issue can, however, be investigated. The n/d value for these coins is 8.7, with 26 coins of this subgroup in the study, the highest of all the subgroups and groups of the Demetrius tetradrachms. With such a good sample it is highly likely that the three dies identified as part of the study were the only ones used in the striking of these coins. Once more we find a different artist brought in to produce a small number of dies, but with the same monogram appearing on the reverse of the coins. The dies of this subgroup are also not linked with those of any of the other coins with  . A different artist and the lack of any links to other subgroups suggest an isolated minting, with the evidence of two workstations, a feature that will be discussed further below (**fig. 51**).

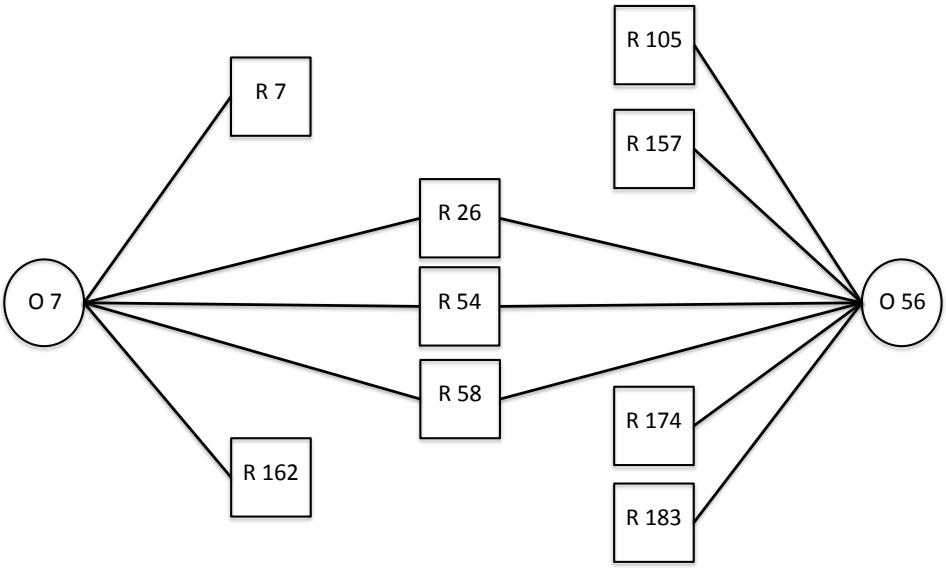

Figure 51: Two workstation die group in Demetrius tetradrachm Group IIc.

The final subgroup of Group II (**fig. 52**) again consists of only three dies, and has a high n/d of 5.3. Group IId is easily distinguished from the other subgroups of Group II by the way in which the diadem ties are depicted. Here they flutter behind the king's head in parallel in quite a different fashion from that seen on the other dies. Although the diadem ties are different, many of the other features of the engraving are similar to the dies of Group IIb, in particular the distinct brow line and the shape of the elephant's ear.

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Figure 52: Obverse tetradrachm dies of Demetrius Group IId.

Mint B

Group III (Ρ,Ρ)

The coins of Group III have one of two possible monograms on the reverse: Ρ or Ρ. The similarity between these two symbols is clear and it is tempting to see rho and lambda (or perhaps kappa) in the first, with the second letter changed to an alpha in the latter monogram. Of course, attempts to expand the letters of monograms have been tried before, with little success, with Cunningham's attempt to see the name of cities being the most expansive.[304] With no understanding of the potential meanings of the monograms such attempts are arbitrary in nature. The close similarity between the two monograms is, however, a feature rarely repeated throughout the Graeco-Bactrian series, certainly on issues struck for the same king. These coins are to be attributed to Mint B because of monogram Ρ. As with the coins of Mint A there is continuity between the issues of Euthydemus and Demetrius.

One difference that is clear within the group is the addition of a bead and reel border engraved around the obverse image of the king. The coins with this feature are subdivided to create Groups IIIa and IIIb illustrated below. As can be seen from the table, the presence of the bead and reel border is not reflected in the choice of monogram on the reverse. It may be possible that the additional crossbar in Ρ reflects some procedural change that is not immediately apparent from the appearance of the coins. Perhaps a different batch of metal, or overseer, was involved in the production of the coins with the monogram functioning more like a hallmark in this case.

[304] Cunningham (1884), 60.

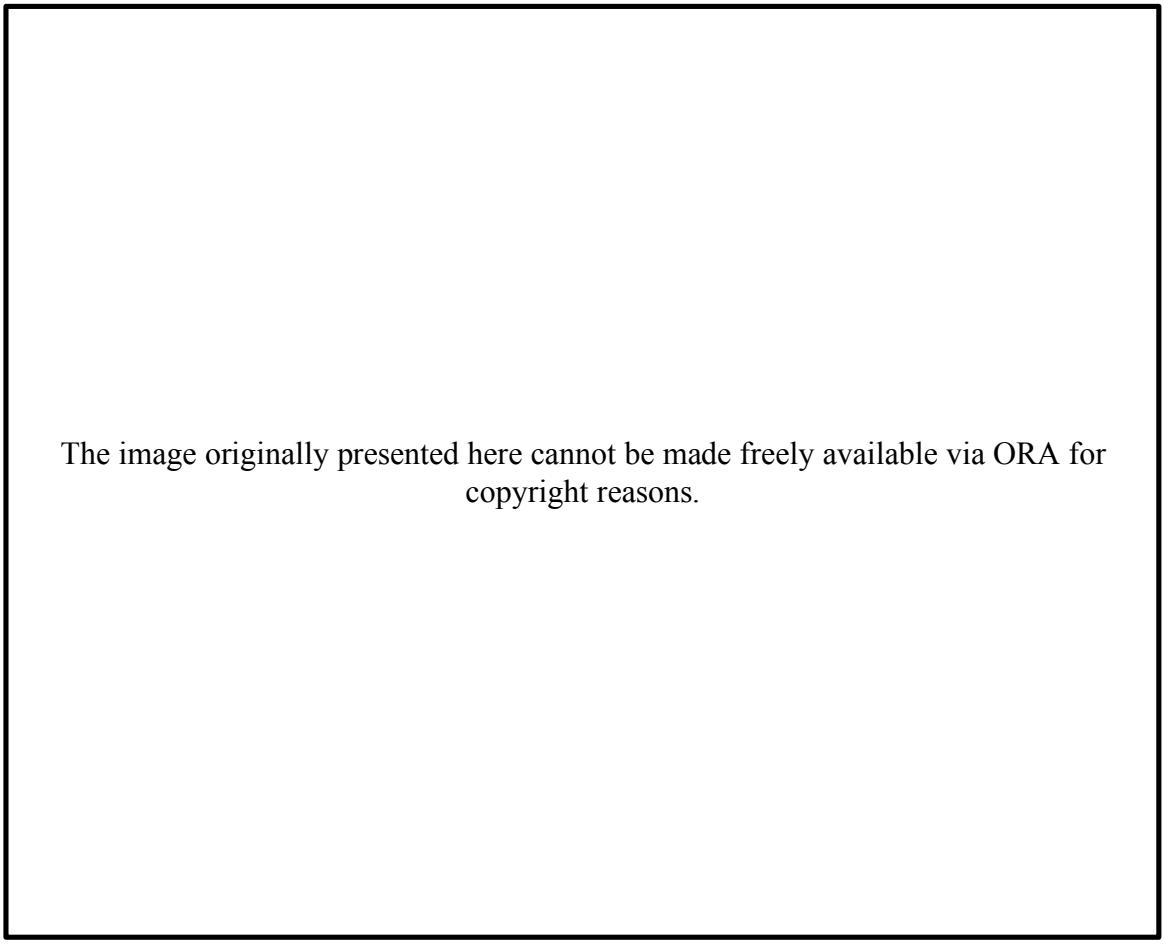


Figure 53: Obverse tetradrachm dies of Demetrius Group IIIa (dotted border).

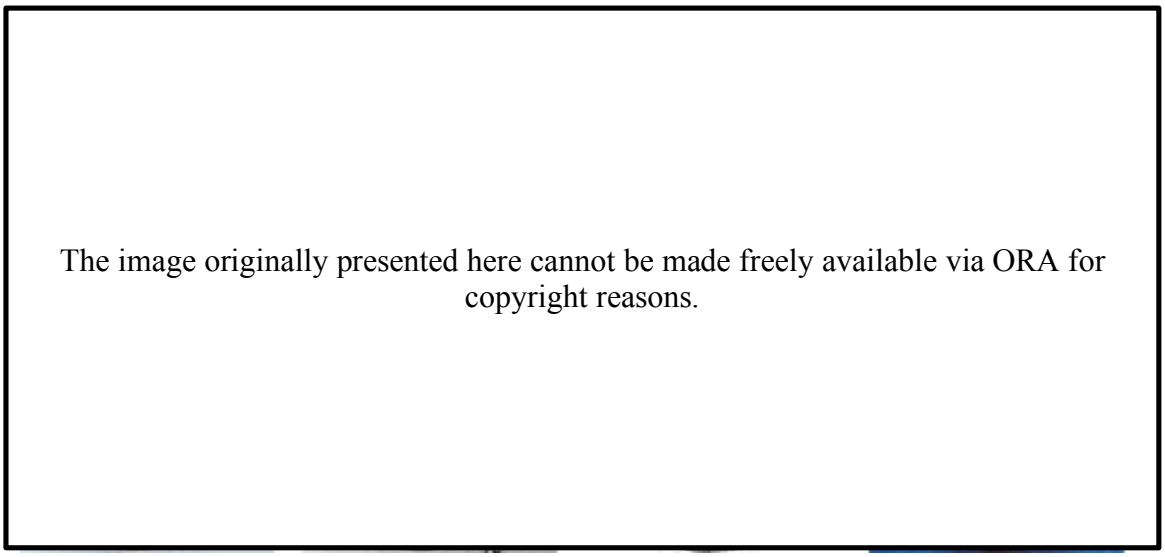


Figure 54: Obverse tetradrachm dies of Demetrius Group IIIb (bead and reel border).

Table 14: Demetrius I Group III tetradrachm monograms.

	𐡀	𐡀	𐡀 bead and reel
Group IIIa	92	22	-
Group IIIb (bead and reel)	24	19	6

The unusual headgear worn by the king in the obverse portrait provides a very useful, and rare, opportunity to identify a feature that seems to have been executed quite differently by each individual die engraver while still working from a shared portrait model. The ear of the elephant scalp helmet is shaped in one of two ways (**fig. 55**). It seems likely that the engraver, while familiar with engraving the facial features of an individual, as well as hair and garments, would be less at ease with the depiction of an elephant scalp helmet. One of the ways of engraving the ear results in a particularly triangular shape, while the other looks quite different and regularly has a notched section on the back of the ear. In the subjective attempt at identifying artists, or the prototype from which they worked, this diagnostic feature of the obverse type is very helpful. When the two different engraving styles are compared with the monograms on the back of the coins, as with the border, there is no correlation. There is, however, one consistent feature: all the coins with the bead and reel border have the second, notched style of engraving of the elephant's ear. This strongly suggests, along with other facial similarities, that the obverse dies with the bead and reel border were engraved by the same artist, and that therefore the inclusion of the border was most likely simply an artistic choice with no further possible inferences. Tarn's supposed Seleucid connection on the basis of the border is to be completely rejected since the bead and reel motif was a common one in the Hellenistic world as well as in later Indian art.[305]

[305] Tarn (1951), 210; Morton Smith (1975).

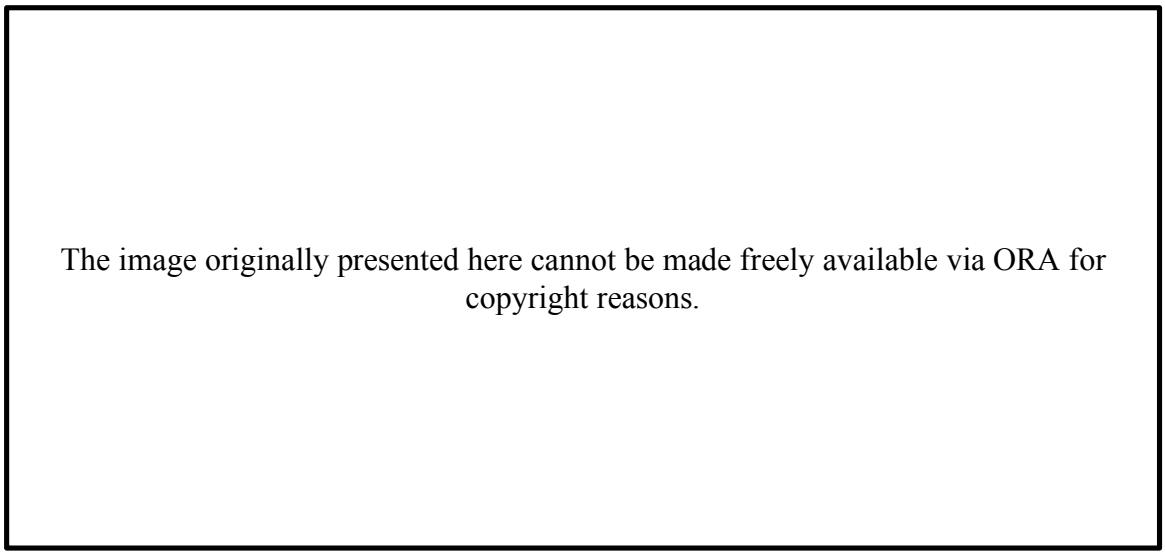


Figure 55: Two tetradrachms of Demetrius Group III with superimposed triangle on left to illustrate different conceptual versions of the elephant's ear (BM India Office collection 6; BM 1870.0701.1).

A final oddity in the group is the inclusion of a bead and reel border on three of the reverse dies. In fact on the coin on the right of **fig. 56** (Qunduz 28) the majority of the border is off the flan, although the type itself is centred. As noted elsewhere the standard of the extant coins suggests that the quality control processes of the mint were well implemented. The addition of this border was presumably the choice of the engraver, but one that, for practical reasons, did not endure.

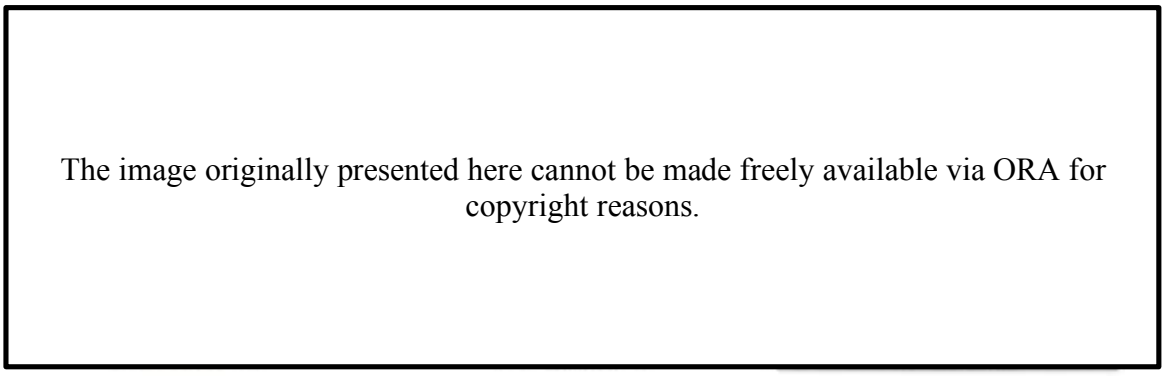


Figure 56: Reverse Demetrius tetradrachm dies with bead and reel border.

Group III as a whole is the largest of the different tetradrachm groups with a total of 33 dies. Perhaps not surprisingly, then, it seems to feature the work of different artists. The group also includes at least one example of a die group (**fig. 57**) that shows evidence of two workstations, indicating a desire for an increased speed of production.

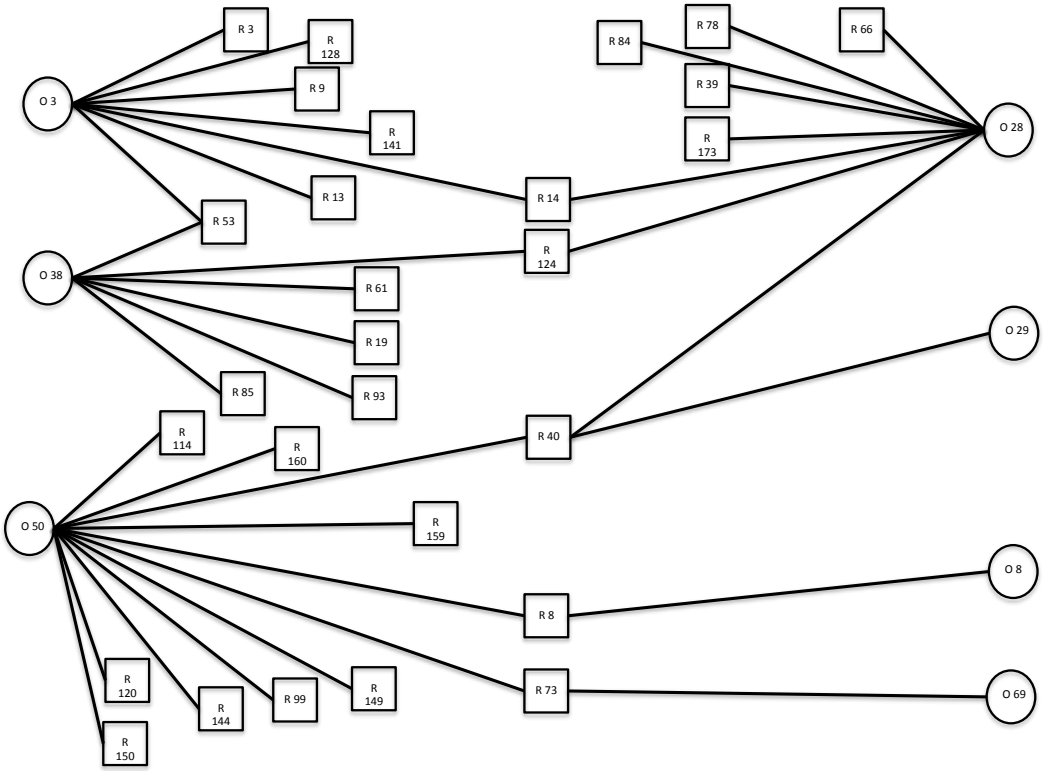


Figure 57: Die linked group of Demetrius tetradrachms (O3) indicating the use of two workstations with a shared reverse die box.

Unattributed mint

Group IV (ΝΚ)

Figure 58: Obverse tetradrachm dies of Demetrius Group IV.

The two final groups of tetradrachms feature monograms that do not appear on the coins of earlier kings, and as such, are not obviously the product of either Mint A or Mint B. Similar to the majority of the dies of Group I, however, those of Group IV show a rougher style, with different elements of the king's portrait shared with the coins of Groups I and II. The elephant's trunk has become very short and is squeezed into the type rather than trumpeting more freely as on earlier dies. Likewise, the distinctive marked brow line of the coins of Group II reappears here, and the whole face is elongated once again. With only two dies (and five coins) in this group it is difficult to draw many conclusions, but it is possible that these coins were produced by the same personnel as some of the coins of Groups I and II. Such an observation, relying solely on stylistic analysis, indicates that these coins are probably to be placed with the issues of Mint A, although a definite attribution is not possible. They are, however, probably indicative of the irregular rhythm of minting, perhaps with engravers from Mint A producing a small number of dies after an administrative change of some sort, indicated by the different monogram.

Group V (Ⱥ)

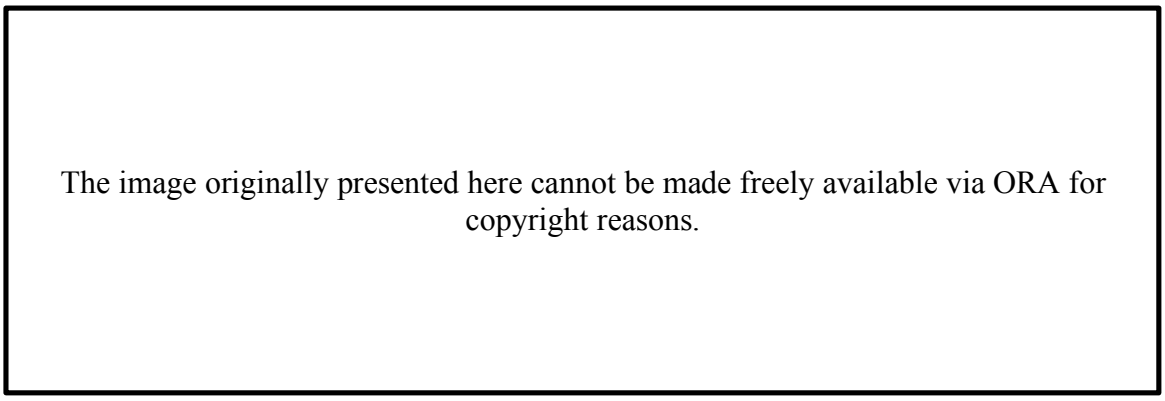


Figure 59: Obverse tetradrachm dies of Demetrius Group V.

Group V is the least well represented of the different groups with an n/d of 1.7 (five coins and three dies). All of the coins again have a previously unseen monogram. From the three dies it is very difficult to draw any firm conclusions. Two dies (left and centre in **fig. 59**) look much closer to the earlier style of Groups III with the fluttering diadem tie and more spread out elephant trunk. It may, therefore, be possible to attribute these coins to Mint B, although, as with the previous group, this is a tentative suggestion. The other die (right) is represented by a single coin sold at auction, which I have been unable to examine.[306] The flan of this coin appears lumpy with a number of cracks at the edge and is very different in appearance from most other Graeco-Bactrian tetradrachms. The style of the portrait is once more copied from the earlier tetradrachms. It is possible that this is a modern forgery, although the weight of the coin (16.95g) is appropriate. Without further examples of coins sharing the Ⱥ monogram it is difficult to exclude this coin and it has therefore been included, with caution, for the sake of completeness.

Drachms

Four different monograms appear on the reverses of the drachms issued under Demetrius ( ,  ,  , and ). The first three of these monograms also appear on the tetradrachm issues and the coins have been separated into groups which share the number of the relevant group of the larger denomination.

[306] CNG Electronic Auction 179, 2nd January 2008, 116.

Table 15: Demetrius I drachm die statistics.

Obverse Type	n	d_o	n/d_o
Group II	1	1	1
Group III	8	5	1.6
Group IV	4	4	1
Group VI	1	1	1
Totals	14	11	1.3

Reverse monogram	n	d_r	n/d_r
	1	1	1
	8	6	1.3
	4	4	1
	1	1	1
Totals	14	12	1.2

The tables above show the numbers of coins and obverse and reverse dies identified from the drachms in the study. It is immediately clear that far fewer examples of the smaller denomination as opposed to the tetradrachms are available, only 14 coins in total. Such a small number, exacerbated by the very low rate of die linkage, makes it difficult to draw conclusions about the scale of the coinage. It is far from certain, for example, that because there are few examples now, the coinage was initially small in size, an n/d of 1.3 does not give any space for inferences to be made. Such poor n/d values, of course, make any attempt to estimate the original number of dies futile.

The image originally presented here cannot be made freely available via ORA for copyright reasons.

Figure 60: Obverse dies of Demetrius Group III drachms.

The largest group, consisting of eight coins, is Group III, with the monogram on the reverse, the obverse dies of which are illustrated in **fig. 60**. The facial features of the portrait as well as the depiction of the elephant's ear and trunk make it clear that these dies were produced by the same engravers as the dies of Group III of the tetradrachms. The distinctions between the two monograms of the tetradrachm Group III, however, are not present on the drachms. We have seen previously that the bead and reel border was only paired with reverse dies with on the reverse. Here, however, we find only , including coin 8 in the study (Giessener

Münzhandlung Dieter Gorny, Auction 76 22nd April 1996, 279), which has a bead and reel border on the obverse.[307]

Only one coin with monogram  (Group II) is included in the study. The style of the obverse of this coin does seem rougher than that of the tetradrachms with the same monogram, although obviously very few conclusions can be drawn from this single coin. A third group of coins with the monogram of the Group IV tetradrachms () share the rougher style of the higher denomination dies.[308] The sharing of artists and monograms between tetradrachms and drachms indicates that the two denominations were produced by the same personnel, at both Mint A and Mint B and at a similar time.

Figure 61:Demetrius drachm, 3.52g (Ashmolean, Hollis Collection).

There is, however, one exception: a drachm with the monogram  on the reverse (**fig. 61**). Bopearachchi, in his *catalogue raisonné*, was not aware of this monogram appearing on any of Demetrius' coins. In fact his only example of a coin featuring this particular monogram came from a single square bronze coin of Apollodotus I (*série* 6) in the British Museum.[309] The appearance of a single coin with such a rare monogram poses many difficulties for potential hypotheses of these symbols. The obverse portrait style does seem to share a superficial similarity with the tetradrachms of Group IIc. The very low weight of this coin (3.52g) when compared

[307] The seemingly short-lived experiment with a bead and reel border on the tetradrachm reverses is not found in the smaller denominations.
[308] Bopearachchi (1991), 165 identified one drachm (*SNG* Copenhagen, 260) as including a monogram  . The illustration of the coin is not of the highest quality, but it would appear that there are two additional lines consistent with a complete monogram of  . The coins have therefore all been included in a single group.
[309] Bopearachchi (1991), 192.

with the mean of the other drachms in the study (3.98g) may indicate that it was not a product of an official mint, making it either a contemporary imitation, or a modern forgery. Such a concern leaves a picture of the drachm issues simply as counterparts of the much larger production of tetradrachms, sharing monograms and obverse styles, and therefore mints.

Obols

The smallest silver denomination struck under Demetrius has been divided into three groups, again on the basis of the monogram on the coin. Die analysis, and even stylistic analysis, of these coins is challenging given their small diameter, and the resulting low quality photographs available. Although these coins are no bigger than 1cm in diameter, a remarkable number survive and have been included in the study. Eighty-two examples were identified with an n/d of 1.7. This value may have been suppressed by the difficulty of establishing die links between such small coins, although with such a large sample, it may also suggest a significant original issue size, estimated using Esty's 2011 formula at 115.8 obverse dies. Although there are clear difficulties with such a number, it is highly unlikely that the original number of dies used in the production of the obols was lower, and may in fact have been substantially higher. This is quite a remarkable number since it makes the obols the largest denomination produced under Demetrius. In comparison the estimate for the number of obverse tetradrachm dies is 80.3.

Figure 62: Obverse dies of Demetrius Group I obols.

The first group of obols is represented by a smaller number of coins in the study than the other two groups and has ⏄ on the reverse, the first monogram of Mint A under Demetrius. Unlike the other two obol monograms ⏄ did not appear on the drachms. This may indicate that the coins of this group were produced at a different time or location from the coins of the other groups.

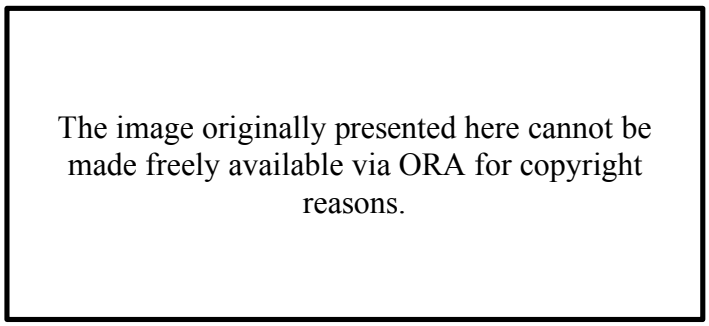


Figure 63: Obol of Demetrius I, 0.67g (CNG Electronic Auction 187, 30th April 2008, 74).

Similar features are to be seen in the second group of the obols, those with the monogram ⏀ on the reverse (**fig. 64**). Here the distinctive arrangement of the diadem ties in which one runs straight down the back of the king's neck while the other, much shorter, runs in the opposite direction for a short way before pointing down, is the same as many of the tetradrachm dies of Groups IIb and IIc. A number of dies also share the same style of depicting the king as the tetradrachms of Group IIc. Here too we find the same engravers working on dies of different denominations.

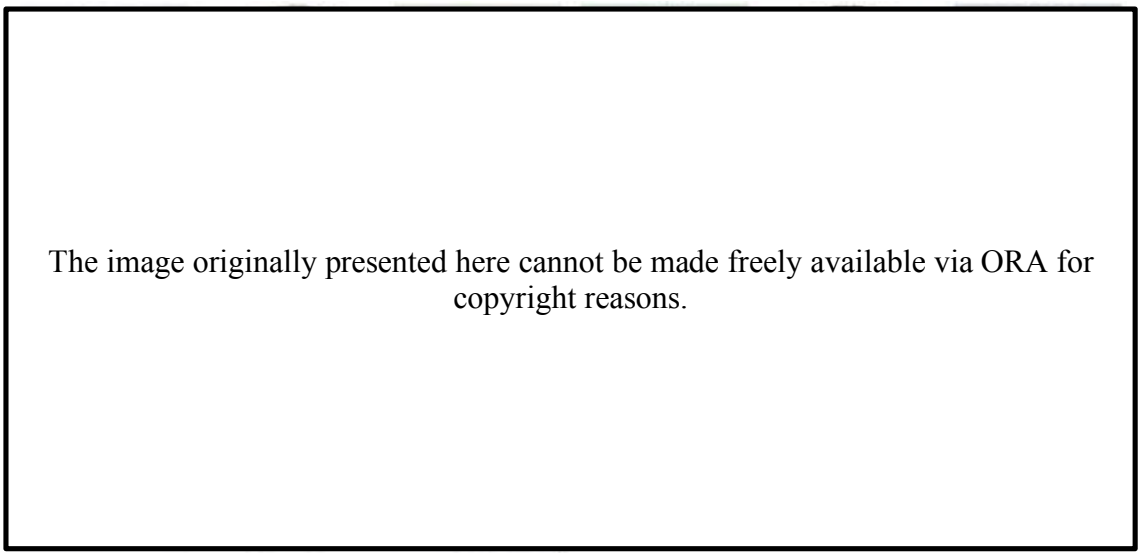


Figure 64: Obverse obol dies of Demetrius Group II.

Group III, with the monogram ⏁ includes coins which share features with the style of the first tetradrachm group. The distinctive brow line in particular is visible on a number of examples. The standard of engraving is remarkably high when the size of the dies is taken into account, with an intricate design skilfully engraved in an

area little more than a centimetre across. Once again it seems likely that the same artists were at work on the obols as the tetradrachms and drachms. Coin 35 in the study (**fig. 63**) is an example of this phenomenon, with the king's facial depiction sharing many similarities with the larger denominations. This strongly suggests that this group of all three silver denominations was produced at a similar time.

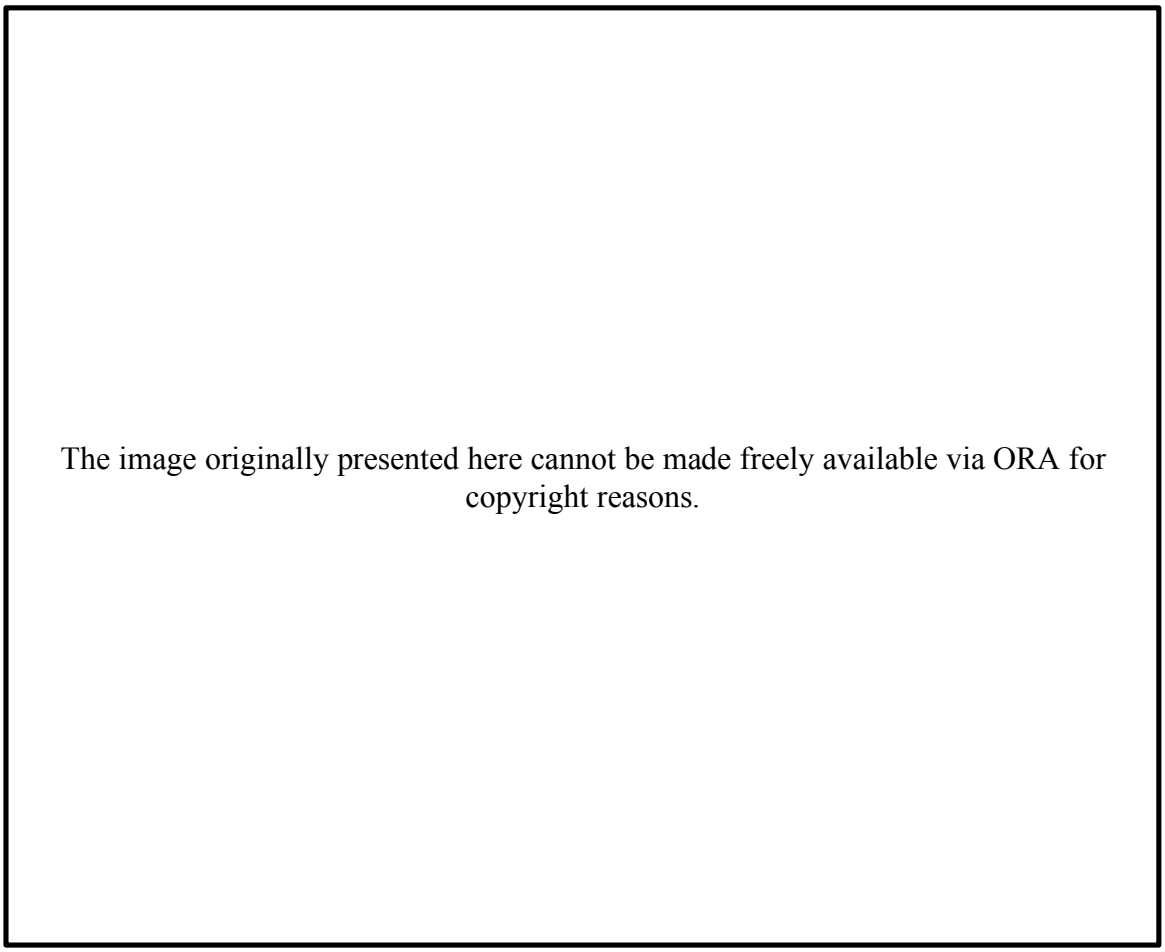


Figure 65: Obverse obol dies of Demetrius Group III.

Group III is the largest of the three different obol groups with 51 coins and 29 obverse dies. In both the tetradrachms and obols the coins with the  monogram make up the largest proportion of each denomination, followed by those with  , while there are too few drachms from which to draw a meaningful conclusion.

Table 16: Demetrius I obol die statistics.

Obverse Type	n	d_o	n/d_o
Group I	6	5	1.2
Group II	25	15	1.7
Group III	51	29	1.8
Totals	82	49	1.7

Monogram	n	d_r	n/d_r
	6	6	1
	25	20	1.3
	51	46	1.1
Totals	82	72	1.1

The simple observation that a seemingly large number of obols (Esty's formula suggests at least 115 obverse dies were used) was produced under Demetrius is interesting. The minting of obols was more expensive for the mint than other, larger denominations, since the cost of the dies and personnel would have been the same, but the value of the output much less. As we shall see, a range of bronze denominations was also part of the system of coinage under Demetrius, some of which seem likely, based on their substantial weight, to have been of a high value. How exactly the coins of the two metals did or did not interact is not certain, but it does seem possible that the intention of the authority responsible for coinage under Demetrius was to produce a full range of denominations, even though this resulted in more expenditure for the mint.

Copper

Three different denominations of copper coins were struck during the reign of Demetrius I: double, triple, and sextuple units.

Table 17: Demetrius I copper coinage.

Denomination	Number of examples (n)	Weight range (g)	Mean weight (g)	Standard deviation	n/obverse dies	Estimated number of obv. dies	Monograms
Monolingual							
AE Double	72	4.26-11.88	7.56	1.06	2.1	68.1	
AE Triple	134	8.14-14.42	11.80	1.00	2.5	87.7	
AE Sextuple	10	18.61-25.69	22.98	1.99	1.4	23.3	

Double

The lightest bronze coins, termed a double unit, because of the existence of a single unit in the coinage of Euthydemus I, feature a bust of Heracles on the obverse, with Artemis on the reverse. There are six different monograms that appear on the reverses of these coins and these symbols have been the basis for the division into groups. As is unfortunately the case with many of the bronze issues in this study, the surface of these coins has often suffered considerable corrosion and identifying features of the coins is regularly quite difficult, leading to further trouble establishing die links. There is, therefore, much less scope for stylistic analysis of the obverse type, and I have been unable to identify artists consistently, although there are some exceptions. With a lack of corresponding features in the different types of the bronze coins, when compared with the regular images on the silver emissions, it has not been possible to identify the same hand at work on the dies used to strike the different metals. Some of the monograms, however, are shared with those that appear on the silver coins and probably indicate the same mints.

Figure 66: Demetrius AE double unit, 7.77g (Ashmolean, Oman 1947).

Table 18: Demetrius I AE double die statistics.

	n	d_o	n/d_o
Group I	19	9	2.1
Group II	3	3	1
Group III	16	10	1.6
Group IV	2	2	1
Group V	8	6	1.3
Group VI	24	5	4.8
Totals	72	35	2.1

Monogram	n	d_r	n/d_r
	19	16	1.2
	3	3	1
	16	14	1.1
	2	2	1
	8	7	1.1
	24	16	1.5
Totals	72	58	1.2

The generally poor state of preservation of this denomination means not all of the six groups will be illustrated or discussed directly. It does seem likely that each group consists of only one hand at work engraving the dies, although identifying the same engraver across different groups has not been possible. The monograms , , and appear on a larger number of dies (often twice as many) than the other three monograms, although with a relatively small sample of coins this may simply be due to a particular preservation bias. Two of the monograms (and) appear only on the bronze denominations. The other four symbols are repeated from the

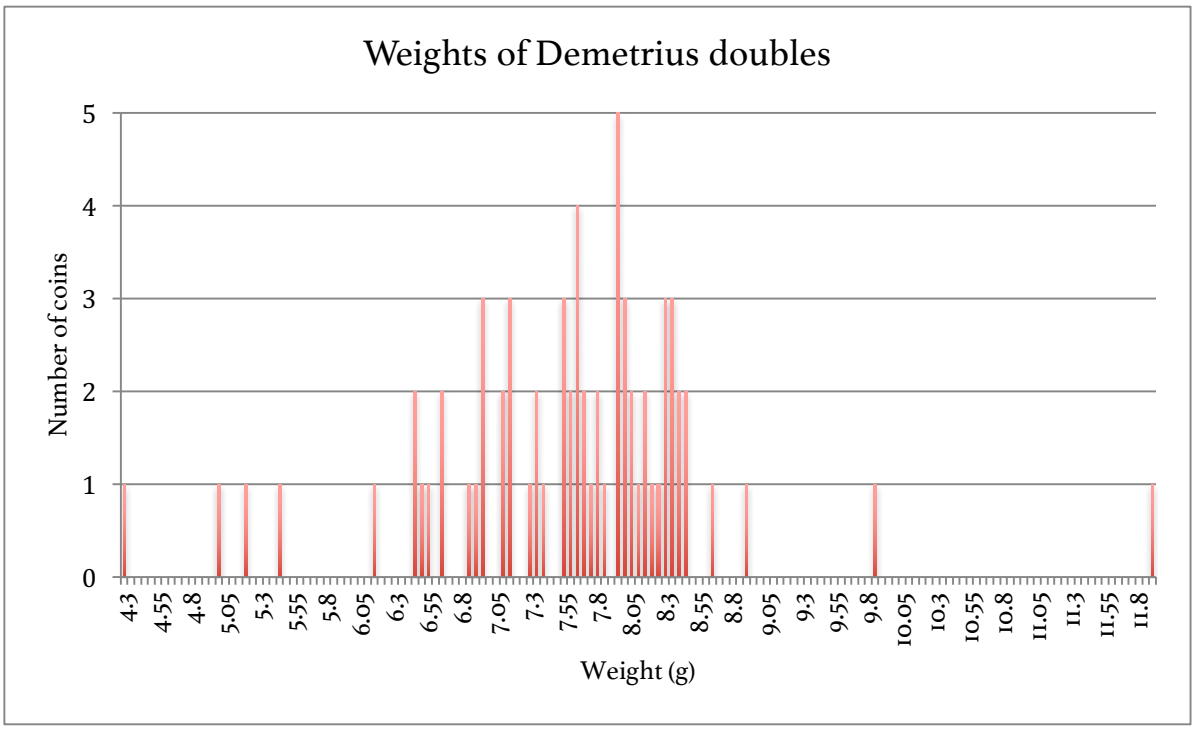
silver coins, suggesting that for these monograms a full range of denominations was produced, while on other occasions there was a separate arrangement for the bronze coins. It is clear, therefore, that there was not a single uniform, constant production of coins, but an irregular output of different denominations produced at different times and probably in different locations. The principal monograms of the silver coinage of Mint A (and) and Mint B ( ) reappear on the double units. The coins with these monograms should therefore be attributed to these mints, although the status of the unique monograms is not clear. They may have been produced at one of the two mints, but under a different administrative system or, perhaps, in a different location altogether.

Figure 67: Obverse dies of Demetrius AE double Group VI.

One group in particular stands out in a number of ways from the rest of the coins of this denomination. Group VI has the largest number of examples (24), but only five dies were identified, giving an n/d of 4.8, much higher than the average for the doubles of 2.1. The generally better state of preservation of the coins of this group may go some way to explaining the much higher representation of coins per die. The style of engraving used to depict the hair on the top of Heracles' head is very distinctive within this group. Rather than the consistent engraving of locks of hair, the upper section of hair is shown as a series of parallel lines. This method of engraving the hairstyle is noticeably different from the other styles, meaning that even when a particular coin was badly corroded, it was often possible to establish a die link, accounting for the higher n/d value of this group. The choice of this style to depict the hair is probably also indicative of the work of a single engraver, with the exception of the die on the far right of **fig. 67**, which looks to be an attempt by a different die cutter to copy this distinctive style. Once again different monograms exhibit the work of different mint personnel.

The chart below shows the distribution of weights of the double unit coins. Although ideally the sample would be larger, giving a sounder basis from which to

draw conclusions, it would appear that the mint was aiming for a weight of 8g for these coins. There is a clear cluster of values around that figure, with more examples less than 8g, a phenomenon that is probably to be explained by the often corroded state of these coins, which leads to a lower weight. This denomination had been continued from the system of coinage under Euthydemus I, and with a weight of 8g, it has been assumed that the denomination was part of the Attic standard and was a dichalkon.[310] Such an identification is far from certain.



[310] MacDowall (1989), 29.

Triple

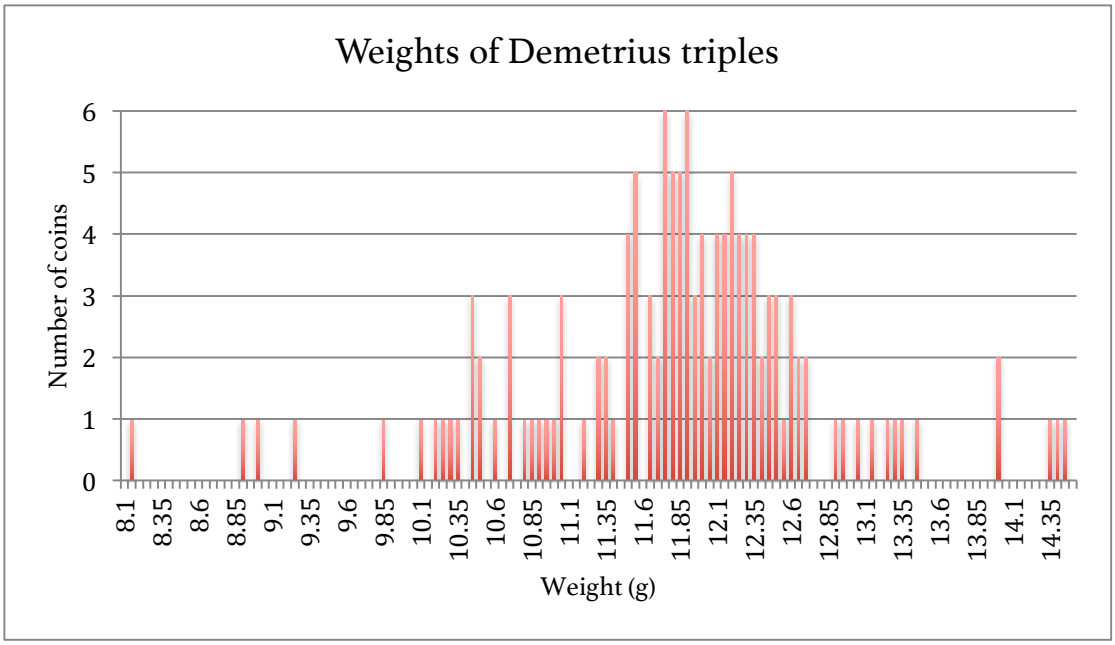
Figure 68:Demetrius AE Triple unit, 12.29g (Ashmolean, Hollis Collection).

The second bronze denomination of Demetrius is the triple unit. The types that appear on these coins are a noticeable departure from earlier Graeco-Bactrian iconography (**fig. 68**). Euthydemus and the Diodotoi had produced bronze coins with a bust of a deity on the obverse, either Hermes or Heracles. Here, however, an elephant's head appears on the obverse. It is obviously tempting to connect this type with the elephant scalp helmet worn by the king on the silver coins, but the image on the triple units is clearly shown with a bell hanging around its neck. This feature presumably rules out interpreting this elephant head as the helmet worn by the king, rather it represents that of an animal that has been domesticated in some way since it wears the bell. The most likely role for an elephant to have would be a military one, and this is presumably the identification to be made here. The reverse type is a divine attribute, a caduceus. Such an object had appeared on Graeco-Bactrian bronze coins under the Diodotoi, although those coins were smaller denominations (units and doubles).[311] Its reappearance under Demetrius may have been to ease the acceptance of this new triple denomination by reusing an already familiar reverse type.

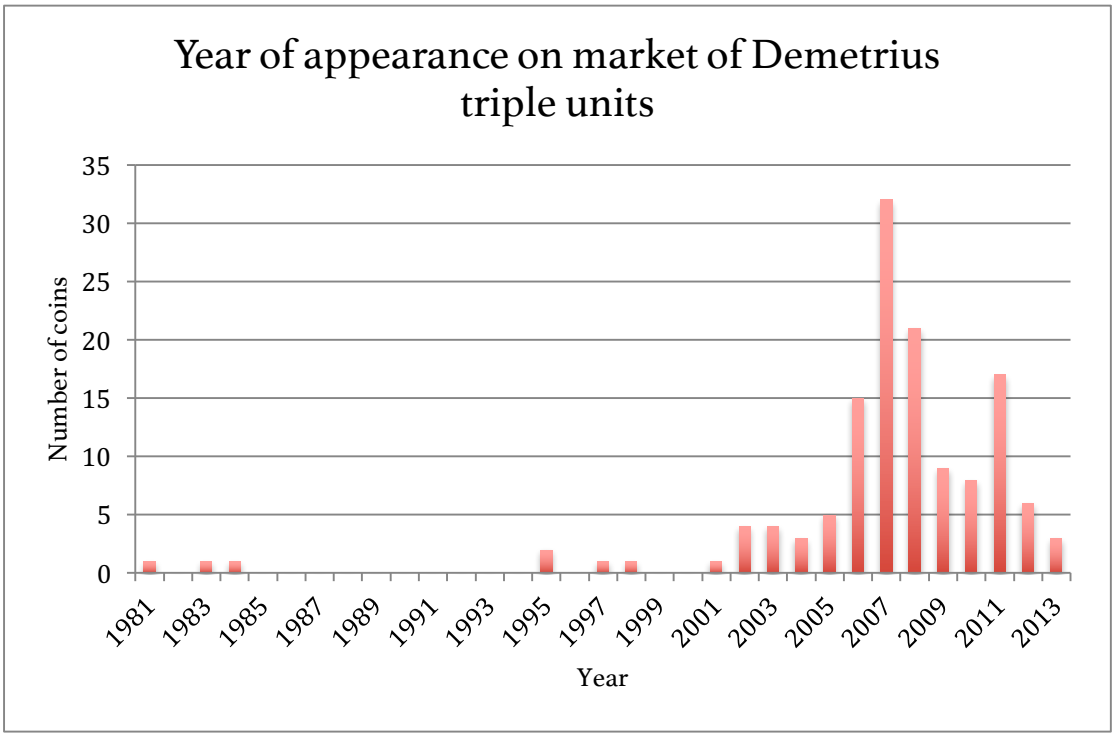
The chart below indicates through the distribution of weights of the coins that the theoretical weight standard seems to have been 12g or slightly lower, although there appears to be greater variance in this weight than the doubles. Overall, however, the standard deviations of the two denominations are similar (1.06 and

[311] *BNBact* série 8-13.

1.00), although much higher than the silver coins, an unsurprising feature since the flans of these coins were not made of precious metal. A weight of 12g has led to this denomination being identified as a trichalkon, although, again, how such a denomination would work as part of an Attic weight standard is far from clear. It is much safer to make no assumption about the denomination or value.



A particularly interesting feature of the coins of this group is their appearance on the coin market. The study contains 134 examples of the triple unit of which 128 (96%) were sourced from commercial numismatic publications dating from 2000 to 2013. This number is all the more striking since it is representative of unique coins, rather than the appearance in trade of the same coin more than once. We have seen already that the number of coins in the study appearing in the coin market is one that increases dramatically in the mid 1990s and remains high, a feature attributable in part to the second Mir Zakah hoard found at the start of that decade. With this denomination, however, the appearance of large numbers of the coins comes slightly later, peaking around 2007. It is possible that this delay does not mean that the coins came from a different source, merely that, as poorly preserved low value bronze coins, they were not among the first to make it to coin dealers. Unlike other examples of the appearance of clusters of a particular denomination there is only a low level of die linking to be found among these coins with the total n/d at 2.5.



One of the consequences of the recent appearance of so many coins is the discovery of a monogram of which Bopearachchi was not aware in his 1991 catalogue. This monogram (𐨐) is unique to the triple denomination of Demetrius I, appearing on no other Graeco-Bactrian or Indo-Greek coins.

Although the n/d is fairly low for these coins it is still possible to estimate the original number of obverse dies used in their production, with Esty's 2011 formula giving a total of 87.7, a slightly higher figure than the 68.1 estimate for obverse dies used in the striking of the double unit. The evidence that the triple unit was struck on a fairly large scale under Demetrius is supported by the reappearance of the obverse type of an elephant head on a bronze issue of Maues, an Indo-Scythian king who ruled at least 100 years later than Demetrius.[312] For such a type to be reused, the original coins must have remained in circulation for a considerable time, a result perhaps of their unusual weight and denomination.

[312] Bopearachchi and Pieper (1998), nos 230 and 231.

Table 19: Demetrius I AE triple die statistics.

Obverse Type	n	d_o	n/d_o	D_O
Group II	82	36	2.3	64.2
Group III	2	1	2	n/a
Group IV	14	3	4.7	3.8
Group V	6	2	3	3
Group VI	20	8	2.5	13.3
Group VII	10	4	2.5	6.6
Totals	134	53	2.5	87.7

Monogram	n	d_r	n/d_r
	82	67	1.2
	2	2	1
	14	9	1.6
	6	3	2
 [313]	20	14	1.4
	10	10	1
Totals	134	105	1.3

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Figure 69: Obverse dies of Demetrius Group VI triple units.

As with the other denominations, the coins have been divided into different groups on the basis of the monogram on the reverse. With this denomination, however, once this division has been made it is very difficult to observe stylistic similarities between the obverses of each group. For example, Group VI contains coins all with  on the reverse. The eight obverse dies of this group are illustrated in **fig. 69**, which clearly illustrates the poor state of preservation of some of the coins as well

[313] Bopearachchi (1991), 167 identified two separate monograms ( and) on the triple unit coins. I have only been able to find a single possible instance of the latter symbol, although it would be possible to read the former monogram. For this reason only the first monogram has been included in the study.

as the quite different styles, in particular the way in which the ear of the elephant was engraved. This seems to suggest that different engravers were at work on the coins of all the groups, even when each group consists of only a relatively small number of dies, a feature very different from other denominations. The Ꝑ monogram is increasingly likely, therefore, to indicate a separate mint at which only copper coins were produced.

One die (the third in the top row of **fig. 69**) has a more emphatic and manipulated style than the others and looks to be a rather poor attempt at copying the elephant's head.[314] The difference is so noticeable that it is possible that this coin was an imitation of the type, an observation supported by its lower than average weight. A lack of stylistic coherence on the obverse dies is also evident in the other groups, indicating different engravers at work. This is very different from the other denominations and it is possible that some of these coins were actually produced as posthumous issues, which would also explain the longevity of the types and the copying of them under Maues.

Sextuple

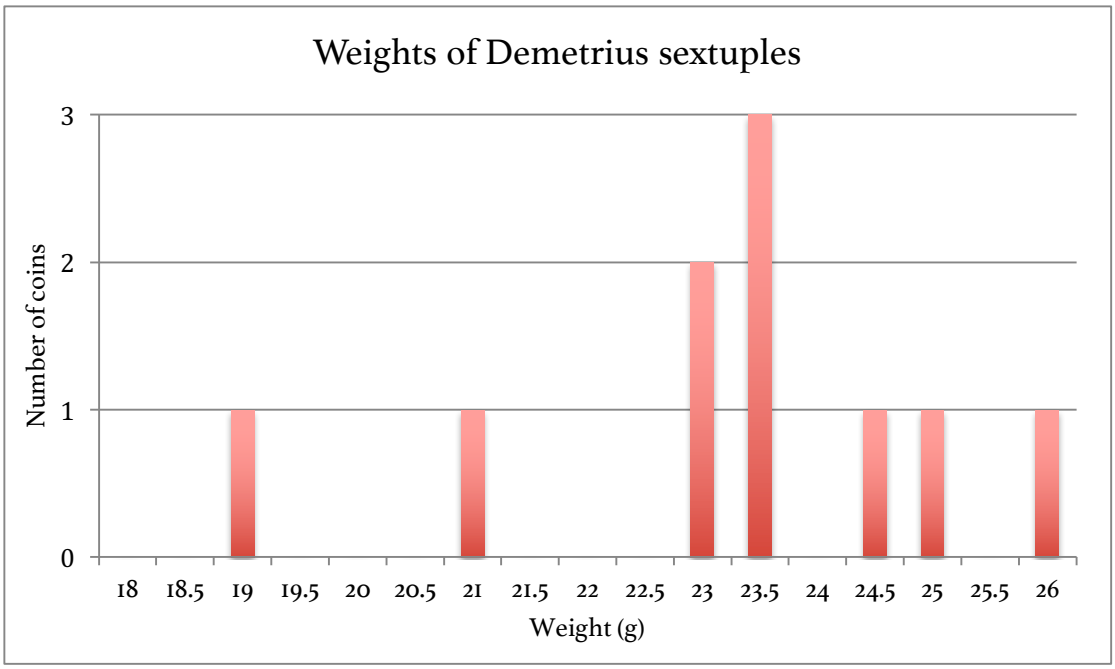
Figure 70: Demetrius AE sextuple unit, 18.61g (Ashmolean, Oman 1947).

[314] Coin 124, 10.59g (CNG Auction 94 18 September 2013, 832).

The bronze sextuple unit coins minted under Demetrius I also moved away from the Graeco-Bactrian tradition of coin types. Here, a shield appears on the obverse with the head of the Gorgon in the centre, while the reverse is a simple trident. Two divine attributes such as these, implying two different deities, Athena and Poseidon, is a departure from the typology of previous coins. The size and weight of the coins themselves is also notably bigger than any other Graeco-Bactrian bronze coins. Also unlike the other denominations struck under Demetrius, the sextuple unit coins make use of a single monogram () on the reverse. This was a new monogram in the Graeco-Bactrian series and does not appear on the other denominations. The use of only one control mark, in tandem with the estimate of 23.3 obverse dies used in their production, suggests a much smaller output than that of the other bronze denominations.[315] With only ten coins in the study it is difficult to identify the intended weight of these coins, although the frequency chart below indicates that it was probably around 24g, making them a sextuple unit (perhaps a hexachalkon).[316]

[315] With a small number of coins (10) and a low n/d (1.4) this estimate should be treated with much caution. The high relief of the gorgon's head, the distinguishing feature of the obverse of the coins, however, made establishing obverse die links particularly challenging and it is quite likely that there are more shared die identities than the evidence allows to be firmly established.

[316] A confusion in the weight of a coin from the British Museum led Mitchiner (1975), 59 to identify a decachalkon denomination, while Bivar (1951), 35 had previously suggested a value of eight units, a number which would fit conveniently into the Attic weight standard as the equivalent of an obol. The weights of the coins, however, make both suggestions impossible.



This small number of available coins is a rather surprising feature of this denomination. When MacDowall published an article in 1989 on the copper coinage of Demetrius he was aware of only 14 examples of the sextuple unit.[317] As mentioned above, large numbers of previously unseen Graeco-Bactrian coins have come to light through the coin market since the mid 1990s, although this flood of coins has not included a single sextuple bronze of Demetrius. Unusually, however, we do have some information on the find spots of a number of these coins, which, unlike the double and triple denominations, seem to have been mainly south of the Hindu Kush. Of MacDowall's 14 coins, seven had a known provenance.[318] One coin was said to have come from Tajikistan, while the remaining six came from areas south of the Hindu Kush: Kandahar, Begram, Jalalia near Hazro, and Taxila. It is tempting to draw much from this evidence, which may corroborate the literary sources in their mention of Demetrius' Indian conquests. MacDowall paired this find evidence with the suggestion that the 'hexachalkon' denomination was an awkward one for the Attic system and therefore that the weight was more likely chosen to integrate with existing Mauryan bronzes circulating south of the Hindu Kush, which weighed between 11 and 13g.[319] With so few coins, one of which came from the very north of Bactria, however, such an argument is unsustainable. As

[317] MacDowall (1989), 30-31. Unfortunately only ten of the coins of which MacDowall was aware had weights and photographs in their original publications, meaning the others were unsuitable for inclusion in the present die study.
[318] MacDowall (1989), 31.
[319] MacDowall (1989), 32.

with the double and triple units, we do not understand the denominational system into which these coins fitted. There was an output of similarly heavy bronzes (20-27.99g) at Ecbatana under Antiochus III, perhaps *c.* 210, although the denomination was only produced at this mint and is poorly understood.[320] Certainly under Demetrius, with such a large production of silver coins of three denominations it would be difficult to argue that a large bronze denomination was introduced to circumvent a shortage of precious metal. If the coins were intended for circulation with pre-existing examples that weighed around 12 g, why was only a coin double that weight produced for circulation south of the Hindu Kush? The triple unit coins of Demetrius were the correct weight, but do not seem to have circulated in the appropriate geographical area. If and when more examples of this denomination come to light their provenance will be the only way to answer this question.

Summary

Under Demetrius I the output of the mint changed in a number of ways from the production of his father. There were no gold issues, while tetradrachms, drachms, and obols were produced. The output of tetradrachms seems to have been substantial. The evidence for the size of the drachm strikings is inconclusive, while surprisingly, given the relative cost of production, the largest denomination was the obol. The lack of distinct series makes it difficult to organise the coins chronologically, although there are some indications as to internal ordering. The evidence of monograms and engravers is different in various groups and seems to suggest a non-continuous minting. Some groups (e.g. tetradrachm Group I) seem to have been produced in a relatively short period of time, while others (Group II) have evidence of different engravers and styles while keeping the same monogram, perhaps indicating breaks in production. It is, of course, impossible to link these gaps with any historical record, but the simple fact that coinage, though often large in output and produced quickly (with evidence of multiple workstations), was not continuously minted throughout the reign is revealing. Such a pattern is visible throughout the different silver denominations, with some monograms used on many more coins than others.

[320] *Seleucid Coins Part 1*, Vol. II, 29.

At the beginning of the production of coinage in the name of Demetrius monograms that had appeared on the issues of Euthydemus continued in use. The reappearance of these monograms suggests some continuity in the minting, and raises the possibility that there was an overlap in production between the two kings' coinages. The control marks also allow the coinage to be organised into two main mints. Some linking types at Mint A between the coins of  and  provide a connection between the two monograms and allow an attribution of the latter to Mint A, a detail that will be of particular importance below.

The bronze coins of Demetrius are, however, a departure from those produced under his father. The double unit continued to be struck with types that were consistent with the Graeco-Bactrian tradition, while two larger denominations were introduced. These coins feature less familiar types, although they are still clearly part of an overall Greek iconographic culture. Find evidence, however, suggests that at least some of these coins made their way south of the Hindu Kush, a feature that may indicate military activity. Being bronze coins, without an intrinsic value, they would likely only circulate in an area that was controlled by the issuing authority. Except for the possibility of a connection to the local weight standard there is, however, no evidence that these coins were designed to engage with a coinage tradition that was non-Greek.

Figure 71: System of production under Demetrius I.

Chapter VI: Euthydemus II

After two kings for whom literary and epigraphic testimony survives, we now enter a particularly difficult period of which the only evidence is numismatic. The problems with our understanding of the kings who followed Euthydemus I and Demetrius I are many, not least among them the lack of certainty of the chronological order of their reigns. The correct identification of homonymous kings has also caused great difficulty. When the first example of a coin with the name Euthydemus in the legend, but a very different obverse portrait and a reverse type featuring a standing Heracles appeared there was uncertainty as to the issuing king.[321] Coins of Euthydemus I, with a different obverse portrait and a seated Heracles, were already known and consequently these new coins were assumed to have been issued by the same Euthydemus.[322] It was not until Rapson, with the benefit of many more coins of different denominations and metals, reattributed those with the standing Heracles type, along with cupro-nickel coins with Apollo and tripod types, that Euthydemus II was firmly established as a Graeco-Bactrian king in his own right.[323]

The uncertainty surrounding the number of kings called Euthydemus did not stop there. More recently both Goukowsky and Lerner have challenged the identification of a second Euthydemus. On the basis of the sharing of the reverse standing Heracles type with the coins of Demetrius I, and the juvenile appearance of the obverse portrait, both scholars identified these coins as issues of the young Demetrius ruling under his father Euthydemus.[324]It was claimed that such an interpretation was supported by the mention of Demetrius as a νεανίσκος by Polybius (XI.34). Lerner also suggested that the portrait actually represented a 'posthumous idealized bust of Euthydemus I'. Frank Holt convincingly rejected both suggestions, correctly pointing out that the coins of Euthydemus II do not fit into the accepted coinages of Euthydemus I and Demetrius I.[325] His other, equally convincing, arguments based on portrait style, metrology, and the monogram progression between the kings as well as the cupro-nickel coins of Euthydemus II,

[321] Raoul-Rochette (1835), 6-8.
[322] Wilson (1841), 222-223; Prinsep (1844), 51.
[323] Rapson (1904), 319.
[324] Goukowsky (1981), 89; Lerner (1999), 112-113.
[325] Holt (2000), 89.

which were also struck under Pantaleon and Agathocles, settle the matter firmly in favour of the existence of a second Euthydemus.[326]

Chronological indicators

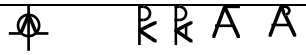
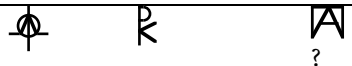
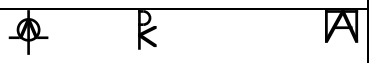
Although we have only numismatic evidence for Euthydemus II, it does provide some indication as to the position of the king in the Graeco-Bactrian series. As already mentioned the reverse type of Euthydemus II's silver coinage, a standing Heracles, is very similar to that employed under Demetrius I. Of the monograms used by the mint for the production of Euthydemus II's coinage only two had not appeared on the emissions of Demetrius. These observations suggest a chronological proximity between the two kings. Likewise, the production of cupro-nickel coins under Euthydemus II clearly links his numismatic output to that of Pantaleon and Agathocles whose systems of coinage also include this novel alloy, while the lack of an epithet on Euthydemus II's coins indicates that he likely ruled before the other kings who struck cupro-nickel coins. Setting aside the existential controversy of Euthydemus II, based on the evidence of the coins, his reign should be placed between Demetrius I's and that of Pantaleon.

Figure 72: Tetradrachm of Euthydemus II, 16.37g (Ashmolean, Hollis Collection)

[326] The possibility of posthumous portraiture will reappear in the chapter discussing the coinage of Pantaleon and Agathocles. It is sufficient to note here that the inclusion of the royal title on a coin is a certain indication that the king was alive when the issue was struck.

System of coinage

Table 20: System of coinage under Euthydemus II.

Denomination	n	Weight range (g)	Mean weight (g)	Standard deviation	n/d_O	Do	Monograms
Monolingual							
AR Tetradrachm	174	13.42-17.04	16.36	0.66	4.2	53.6	
AR Drachm	30	3.35-4.28	3.99	0.25	3.3	12.9	 ?
AR Hemidrachm	3	1.62-2.10	1.91	0.26	3 [one die]	n/a	
AR Obol	22	0.55-0.71	0.66	0.04	2.2	18.3	
CuNi Double	48	5.79-8.46	7.57	0.58	1.5	105.6	
CuNi Unit	8	1.42-3.73	3.13	0.94	1.8	9.3	
AE Triple	18	6.20-12.79	11.19	0.81	6	3.6	

The output of silver coins under Euthydemus II holds few surprises. No gold coins were struck while the usual silver denominations are present: tetradrachm, drachm, and obol, all of which had been produced under Demetrius I. More surprising is the issue of hemidrachms, a denomination that, after Euthydemus I, had been omitted from the coinage. The greatest change in the system of coinage was the introduction of a new metal. These cupro-nickel issues were struck to the same weights as the double and single unit bronze coins of previous Graeco-Bactrian kings. This innovation did not, however, replace the use of copper, which was still used to strike triple unit coins.

Tetradrachms

The study includes 174 tetradrachms of Euthydemus II, with an n/d value of 4.1. Esty's 2011 formula gives an estimate for the number of obverse dies as 55.4, a figure significantly lower than Demetrius I's 80.3. The types and legend of Euthydemus II's silver coins remain consistent, making a division into series impossible. The coins have therefore been placed into groups on the basis of the monogram, as well as the position of the legend in relation to the type. The numbering of these groups should not necessarily be taken to imply a chronological order of their production.

Table 21: Euthydemus II tetradrachm die statistics.

	n	d_o	n/d_o	D_O
Group I	76	16	4.8	20.3
Group II	6	3	2	6
Group III	2	1	2	n/a
Group IV	90	22	4.1	29.1
Totals	174	42	4.1	55.4

Monogram	n	d_r	n/d_r
	76	48	1.6
	6	5	1.2
	2	2	1
	85	43	2
	5	3	1.7
Totals	174	101	1.7

Mint A

Group I ()

Group I is made up of coins with the monogram  . Unusually this mark appears on coins of every denomination struck under Euthydemus II. It is also found on coins of Demetrius I, Pantaleon, and Agathocles, and as we saw in the previous chapter can be securely attributed to Mint A. Group I consists of 76 coins with 16 obverse dies identified, making it a substantial issue and the second largest produced under Euthydemus II. The 16 obverse dies are illustrated below (**fig. 73**). They show a consistent depiction of the face: the king has the same unmarked, youthful appearance on every die, while the short locks of his hair are shown in three distinct rows, with a fourth bound by the diadem (see **fig. 75** for a larger image). Below the line of the diadem two rows of locks are always distinguishable on the king's temple, with a substantial sideburn extending down the side of the head in front of the ear. The fringe is never straight and has a much shorter lock of hair above the king's eye. Although these features appear consistently on the obverse dies of Group I, there are also some minor differences to be observed. The diadem ties, although always depicted in motion, are not engraved in a consistent manner. Sometimes they run in parallel, while on other dies one makes a near-horizontal wave shape behind the king's neck, while the other tie runs straight down to his shoulder before making an upward turn for a short distance. Likewise the neckline of the king's chlamys is sometimes shown as a relatively wide 'u' shape, while other dies are engraved with a narrow 'v' line. These similarities and differences are useful in attempting to identify the work of different engravers. The

clear facial similarities, as well as the consistent way of engraving the king's hair (in particular the shorter lock above the eye) suggest at the very least that a single portrait model was followed by the engravers cutting the dies. The slight variations may indicate different engravers' work, but it is more likely that they are simply the result of artistic whims and that the dies of Group I were all engraved by a single worker.

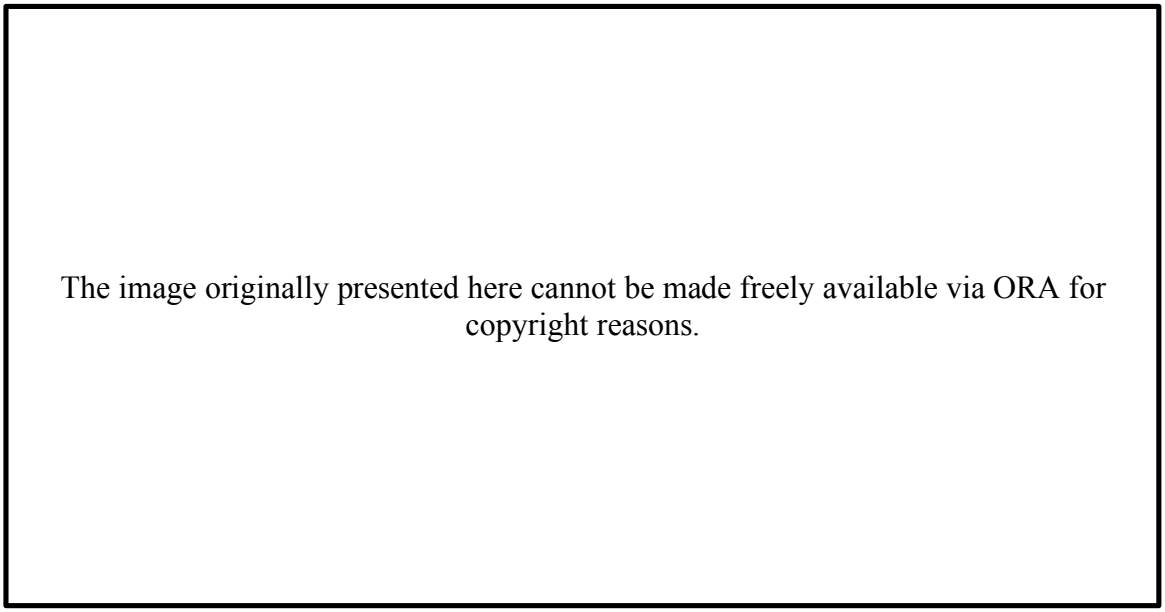


Figure 73: Obverse dies of Euthydemus II Group I tetradrachms.

One die group (**fig. 74**) was produced using at least two separate workstations. This group is unusual in the study in allowing a chronological order of minting to be identified. Intra-die analysis of O21 indicates that the die progressively deteriorated between its use with R74, R20, and R30, allowing the conclusion that these reverse dies were used in that order.

Often throughout the current study the reverse dies have provided little opportunity for analysis. Other than the appearance of different monograms, the reverse type and legend have almost always been engraved in a consistent fashion with very little variation between groups of coins. The tetradrachms of Euthydemus II, however, differ with the appearance of a variation in the position of the type in relation to the legend. Every reverse die of Group I has a layout in which the wreath in Heracles' outstretched arm interrupts the legend between the letters Y and Θ. Such a placing of the type in between letters of the legend is found very

rarely elsewhere on Graeco-Bactrian coins.[327] An interaction between type and legend is also not unknown on other Hellenistic coins and the tetradrachm reverse of Lysimachus featured Nike crowning the first letter of the ruler's name provides an interesting point of comparison.[328] Since the wreath occurs in the middle of Euthydemus' name such an explanation is unlikely here. We shall return to this unfamiliar layout of the legend later.

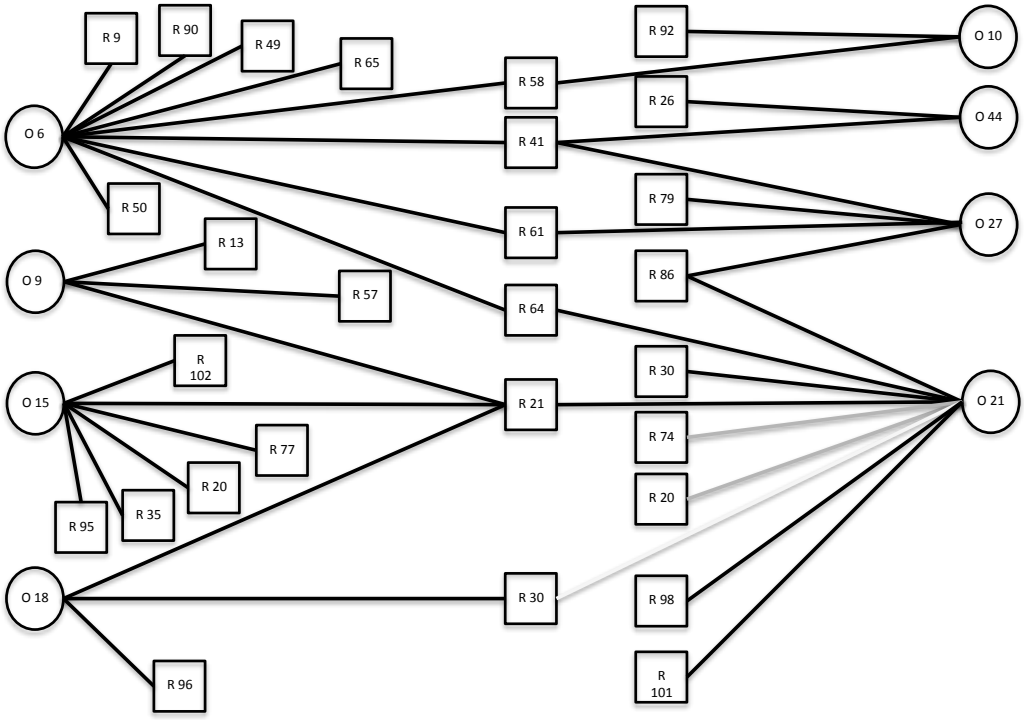


Figure 74: Euthydemus II tetradrachm Group I die group showing use of two workstations. Intra-die analysis of O21 indicates a chronological order for R74, R20, and R30, indicated by progressively lighter coloured lines.

[327] See Diodotus I and II (*BNBact* séries 8-11); Antimachus I (*BNBact* série 5).
[328] Mørkholm (1991), 81.

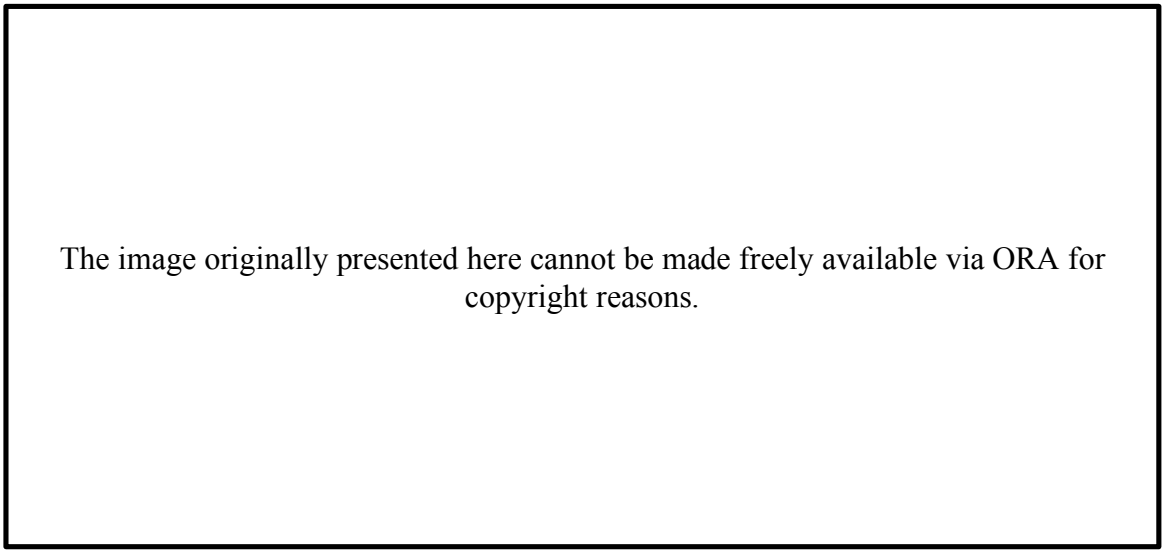


Figure 75: Euthydemus II tetradrachm of Group I (BM 1888.1208.98). Note position of wreath on reverse.

Groups II & III (A, A)

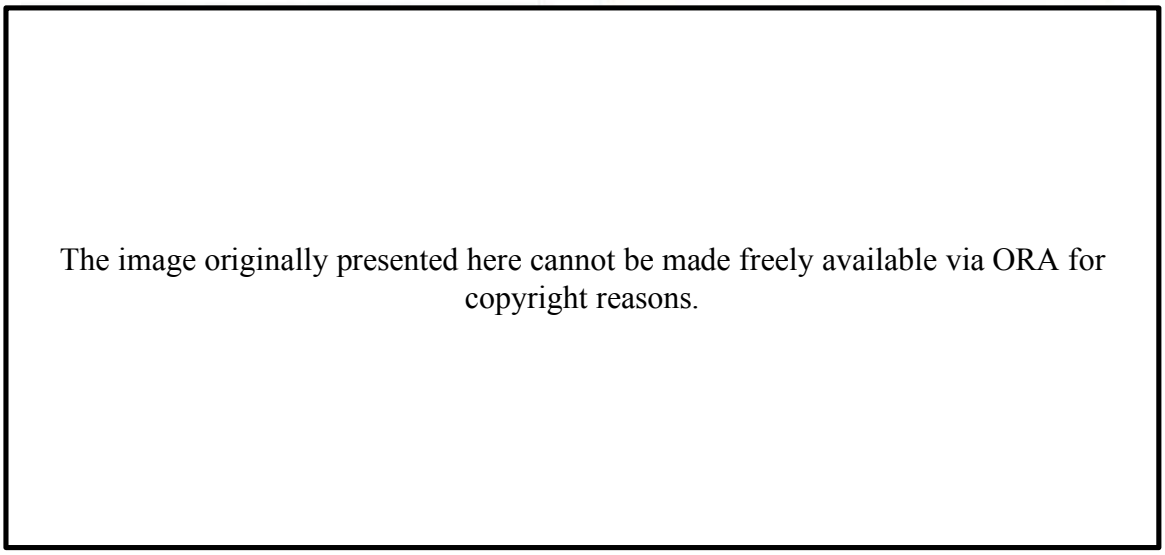


Figure 76: Obverse dies of Euthydemus II Group II tetradrachms.

Groups II and III are much smaller than Groups I and IV, consisting of only two and one obverse dies respectively, and will be discussed together. The obverse dies of Group II are illustrated above (**fig. 76**). There is little doubt that these dies were produced by the same engraver. The flowing ties of the diadem are engraved in the same way on both dies. Each die has the same indication of rolls in the neck, while the method of engraving the king's hair is consistent: three rows of locks are shown above the line of the diadem, with a single complete row below. This differs from

the three and a half rows shown on the dies of Group I, which reappears on the single die of Group III. The notch in the line of the fringe is also present consistently on the dies of Groups II and III, indicating that the same prototype was used as that for Group I. In the previous chapter Demetrius tetradrachms with the Ⱥ control mark were tentatively assigned to Mint B. Under Euthydemus II, however, these coins share more similarities with the coins of Mint A.

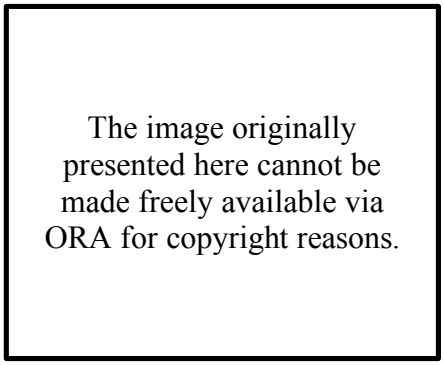


Figure 77: Single die of Euthydemus II Group III tetradrachms.

There is another connection between the coins of Group I and those of Groups II and III. The distinctive layout of the reverse legend remains on the coins of the last two groups, but is not present on the coins of Group IV. The evidence of the shared prototype on the obverse of the coins of the first three groups as well as the unique layout of the type in relation to the legend strongly suggests that these groups shared the same personnel, and probably therefore a location, in their production. Although the three groups are connected in this way, they are of very different sizes. The coins of the first group were far more numerous than those of Groups II and III.

Mint B

Group IV (Ϸ, Ϸ)

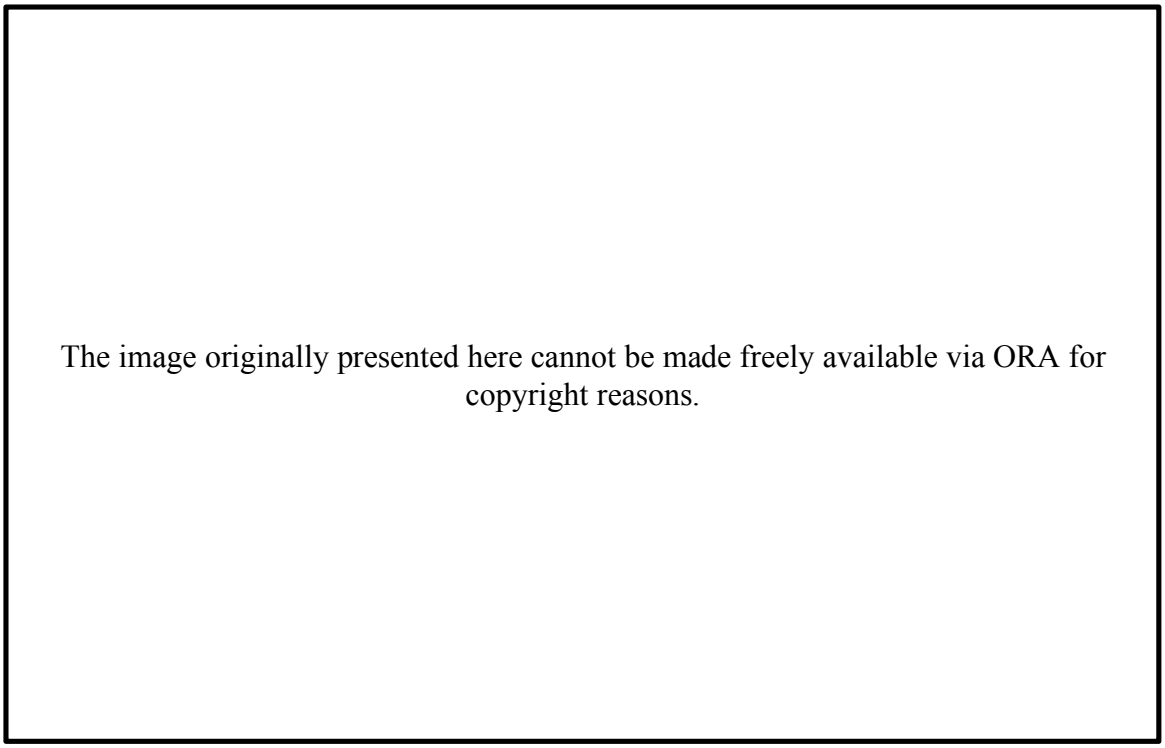


Figure 78: Obverse dies of Euthydemus II Group IV tetradrachms.

The tetradrachms of Group IV have either Ϸ or Ϸ on the reverse and therefore are issues of Mint B since the monograms were used there under Euthydemus I and Demetrius. The group is made up of 90 coins with 22 obverse dies, giving an n/d of 4.1. The estimated number of obverse dies for the tetradrachms of this group is 29.1, making it the largest of the four groups. The coins of this group are clearly different from those of the previous three since the layout of the reverse legend and type returns to a separated composition, in which the wreath does not interrupt the letters of the king's name (**fig. 79**). The obverse type is not so clearly different from that which appears on the coins of Groups I-III. Within Group IV, however, there seems to be evidence of multiple engravers since the diadem ties are depicted in various ways, with the neckline of the chlamys sometimes coming to a point and other times curved. Likewise the engraving of the short locks of the king's hair is not as consistent as the execution in Group I.

Figure 79: Tetradrachm of Euthydemus II Group IV, 16.37 (Ashmolean, Hollis Collection).

Drachms

The arrangement of production for the drachms is quite similar to that of the tetradrachms. Three monograms appear on the reverse of the coins of this denomination:  ,  , and  or a similar variant. The obverse dies of the first group are illustrated below (**fig. 80**).

The image originally presented here cannot be made freely available via ORA for copyright reasons.

Figure 80: Obverse dies of Euthydemus II drachm Group I.

The group is made up of 19 coins with five obverse dies used in their production. The five dies seem to have been produced by the same engraver, with little variation in the neckline, the formation of the hair, or the way in which the diadem ties flow. It is highly likely that these dies were cut by the same hand as those of the Group I tetradrachms. Likewise, the reverse of these coins has the same layout of Groups I-III of the larger denomination in which the wreath held by Heracles interrupts the king's name in the legend, suggesting that the same model was used.

Table 22: Euthydemus II drachm die statistics.

Drachms	n	d_o	n/d_o	D_O
Group I	19	5	3.8	6.8
Group II	8	1	8	1.1
Group III	3	3	1	n/a
Totals	30	9	3.3	12.9

Type	n	d_r	n/d_r
	19	13	1.5
	8	5	1.6
 ?	3	3	1
Totals	30	21	1.4

The drachms of Group II () are similarly connected to the tetradrachms with the same monogram (Group IV). The reverse type does not interrupt the legend on any of the coins of these groups of the two denominations. Unlike Group IV of the tetradrachms, however, the second group of drachms is much smaller relatively, with only a single die employed to strike the eight coins in this study. A parallel issue to the tetradrachms again seems likely here, although this time much smaller.

Figure 81: Drachm of Euthydemus II Group II, 3.98g (Ashmolean, Hollis Collection).

The final group of drachms, Group III, does not seem to fit so neatly with the tetradrachm issues. It is, in fact, rather difficult even to establish the monogram that appears on the reverses of these coins (**fig. 82**). In his *catalogue raisonné* Bopearachchi was aware of only one drachm of Euthydemus II with this mark.[329] He indicated that his reading of the monogram was uncertain and suggested

[329] BM 1888.1208.99.

since it undoubtedly appears on the obols of Euthydemus II.[330] For the same reason such a reading of the monogram is the most likely. The lack of clarity with which it was engraved on the die is quite striking on the examples illustrated in **fig. 82**. It is far from clear whether the three dies all feature the same monogram, with that on the right of the illustration looking quite different from the other two. What is certain about the drachms of Group III, however, is that they should be linked to the drachms of the first group as well as the tetradrachms of Group I since the reverse layout is similar with the interruption in the king's name. Further analysis of the coins of this group is precluded by its small size: each die is represented by only a single coin. It seems likely that this group had a similar position in the production as Groups II and III of the tetradrachms, being much smaller than Group I, but sharing some of its features, and presumably therefore its personnel and location of production.

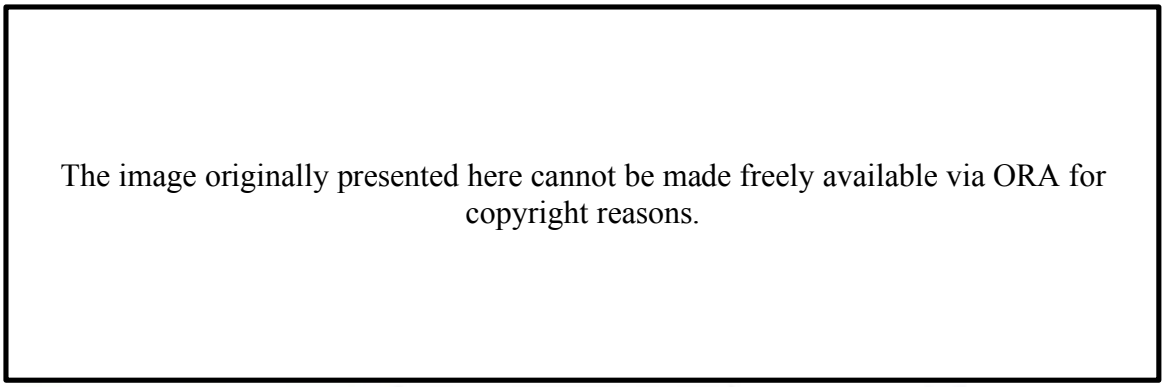


Figure 82: Reverse dies of Euthydemus Group III drachms.

Hemidrachms and obols

Only three of Euthydemus II's hemidrachms survive, all with the monogram  and all struck by the same obverse die. Once more the legend is interrupted by the placement of the wreath held by Heracles and the engraving of the obverse seems remarkably close to that of the obverses of the tetradrachms and drachms of their respective first groups, making them a parallel production from Mint A.

[330] Bopearachchi (1991), 169.

Figure 83: Hemidrachm of Euthydemus II, 2.02g (Ashmolean, Hollis Collection).

Table 23: Euthydemus II obol die statistics.

Obols	n	d_o	n/d_o	D_O
Group I	5	2	2.5	3.3
Group II	14	5	2.8	7.7
Group III	3	3	1	n/a
Totals	22	10	2.2	18.3

Monogram	n	d_r	n/d_r
	5	4	1.3
	14	12	1.2
	3	3	1
Totals	22	19	1.2

The picture of the production of the obols also looks familiar. Three monograms were used ( ,  , and ). Once again the legend is interrupted on the reverse of the coins of Groups I and III (and). Despite the small size of the coins it is also possible to see the work of the engravers of the different groups of the tetradrachms, particularly in the way that the king's hair was engraved.

Cupro-nickel and bronze

The next series of coins struck under Euthydemus II requires a substantial introduction. Until this point we have been dealing with coins that fit clearly into the tradition of Greek coinage in the Hellenistic period and the two precious and one base metals that were used for coinage: gold, silver, and bronze. Coins with an appearance that was quite different from that of a coin of one of these metals first came to the attention of Alexander Cunningham, who gave examples to Walter

Flight of the British Museum for analysis, the results of which were published in 1868.

Figure 84: Cupro-nickel double unit coin of Euthydemus II, 7.51 g (Ashmolean, Hollis Collection).

The coins themselves feature types different from those on the silver. On the obverse appears a laureate head of Apollo, while the reverse shows a tripod with the usual legend: ΒΑΣΙΛΕΩΣ ΕΥΘΥΔΗΜΟΥ. The coins are struck as double or single units, the same weights used for bronze coins under the Diodotoi and Euthydemus I.[331] There are also coins with the same types, but clearly struck from bronze as triple units. Similar coins were also produced under Pantaleon and Agathocles, although with different types, an obverse head of Dionysus and a panther and vine on the reverse. Only double units were produced under Pantaleon, while Agathocles also struck units. These coins also had bronze counterparts, although under Pantaleon and Agathocles the only denomination that was produced was the double.

One of the coins of this unfamiliar metal is illustrated above (**fig. 84**). It has quite a different appearance from the bronze coins. The surface of the metal is a silvery-white colour and exhibits wear differently from bronze coins. Well-handled

[331] Bopearachchi (1991), 169-170 identified two coins in the British Museum as nickel triple units. This is an unfortunate error which has the potential to cause considerable confusion. The coins are bronze as indicated by Cowell's analysis and a personal review of the trays and as such are part of Bopearachchi's série 8.

bronzes often have large parts of their surface worn down considerably to a smooth, and shiny finish. This is not the case with the coins of the type illustrated above. These coins have a pitted appearance across their whole surface, even on areas of higher relief that would be expected to exhibit the kind of wear discussed above. Some coins also have a distinctive green coating, particularly around areas that have obviously been corroded. Others even have small spots of a red rust-like appearance which are only visible on very close inspection. The surface of the coins, as well as being pitted, often has a powdery feel to it and a number of the coins have fractures in their sides, exhibiting the brittle properties of the metal.

It was these distinctive features of the coins, as well as their general appearance and colour that ruled out a metallic composition similar to the usual bronze coins of the Graeco-Bactrian kingdom, and led Cunningham to seek an analysis of the coins. The method used by Flight was wet chemical analysis, a relatively accurate but destructive technique. His results were as follows:

Table 24: Flight (1868) wet chemical analysis results of Euthydemus cupro-nickel coin.

Metal	Composition (%)
Copper	77.585
Nickel	20.038
Cobalt	0.544
Iron	1.048
Tin	0.038
Silver	trace
Sulphur	0.090
	99.343[332]

It was clear that the metal used to produce these coins was chemically quite different from that of the bronze coins, and had a large proportion of nickel.[333] This

[332] Flight (1868), 306.
[333] It should be noted that these coins are often referred to as 'nickel', see for example Macdonald (1922), 449 and Widemann (2009) in which a chapter is entitled '*les rois du nickel*'. The nickel content of these coins rarely rises above 20%, making 'cupro-nickel' a much more accurate way of describing the alloy. Such misleading terms have in fact led to one exotic hypothesis for the origin of the metal, that it came from a nickel-rich iron meteorite that had landed in Bactria. It fell to Moss (1950) to rule out this possibility.

cupro-nickel alloy was puzzling, and the possibility of finding its origin would have great implications for the field. The only comparison Flight was able to provide was from an analysis of a Chinese 'white copper' artifact which had a similar composition of copper and nickel. Although this was a simple observation on Flight's part the connection was made between Graeco-Bactrian coins and this particular Chinese alloy, which was to influence historical reconstructions of the period for some time.

Cunningham was the first to seize upon this link to China and sought literary evidence that would corroborate this interpretation. Quintus Curtius (IX. 8) refers to exotic gifts given to Alexander by Indian envoys amongst which were 100 talents of *ferrum candidum*, 'white iron'. Cunningham suggested that this was a reference to a Chinese nickel alloy that had made its way to the region through trade via the western coast of India.[334] Tarn built further on this hypothesis by suggesting that the metal was acquired not through trade, but by a Euthydemid military conquest of an area of 'Chinese Turkestan'.[335] It did not take long for the assumption that the metal was transported long distances to be challenged on the basis that the ingots would have been heavy, and the only feasible route was by land, an option that would have been prohibitively expensive.[336]

The next step in the interpretation of these coins came with the x-ray fluourescence (XRF) analysis undertaken by Cheng and Schwitter. They compared the results of their analysis of the metal in the Graeco-Bactrian coins with analyses of Chinese artifacts as well as a variety of metal sources.[337] Their interpretation of the results was that there was a correlation between the results of analysis of the Bactrian coins and those of later Chinese objects made from *pai t'ung* 'white copper' ores. Most importantly they claimed that the source of the cupro-nickel alloy for the Graeco-Bactrian coins was at Hweili in what was the then Sikang province of China.

[334] Cunningham (1884), 308.
[335] Tarn (1951), 87.
[336] Caley (1943); Cammann (1956).
[337] Cheng and Schwitter (1957).

Almost immediately this hypothesis was vehemently rejected by Cammann.[338] He suggested that *pai t'ung* in fact referred to a different metal that contained no nickel and that Cheng and Schwitter had misunderstood the Chinese words. Cammann also correctly doubted the interpretation of their analyses, which in fact show levels of nickel in the Chinese artifacts that were much lower than those they found in the Bactrian coins. Cunningham's interpretation of the *ferrum candidum* of Quintus Curtius as the cupro-nickel alloy was also said to be false, with Cammann suggesting that it was steel instead that was being described. Finally, Cammann refused to accept Cheng and Schwitter's identification of Hweili as the source of the metal since it had not been claimed by the Han Dynasty until after the time of the Euthydemids and he suggested there was no evidence of mining activity there until centuries later. Cammann did go on to offer his own suggestion for the source of the alloy being in the general region of the city of Nagarahara, near modern Jelalabad. Unfortunately this was based heavily on Tarn's interpretation of the monograms on the coins and should be seen as unsubstantiated guesswork. He did, however, provide a reference to Lord Curzon's work on Persia in which it was suggested that a nickel ore had been found in the central Nain District of that country.[339]

Schwitter later acknowledged that there were errors with the analysis he and Cheng had undertaken on the cupro-nickel coins, in particular the false reading of quantities of lead between 5.4 and 8.1%.[340] The relatively low nickel content remained, however. None of the coins tested by Cheng and Schwitter registered a nickel content higher than 13.8%, considerably below the 20% recorded by Flight. These lower readings allowed Cheng and Schwitter to claim the link to the Chinese artifacts they tested, none of which had a nickel content higher than 10% in their analysis. Further tests have shown that this relatively low reading for nickel is false and the link to Chinese *pai t'ung* should be disregarded once and for all.[341] Analysis carried out in 1965 on jewellery and other small artifacts found at Taxila showed nickel contents of between 9 and 21% in some cases.[342] The temptation to link this

[338] Cammann (1958).
[339] Curzon (1892), vol. 2, 519. This potential source was confirmed in a more scientific manner by Bariand (1963).
[340] Schwitter (1962).
[341] Howard-White (1963); Cowell (1986).
[342] Prakash and Rawat (1965).

finding to the assumed connection of Pantaleon and Agathocles with Taxila is great.

The best scientific analysis of these coins was undertaken at the British Museum in 1986 by Cowell.[343] He identified the problems with Cheng and Schwitter's results, which had been obtained through XRF, a technique that only measures the surface of the object.[344] In particular Cowell noted that Cheng and Schwitter's analysis often gave total percentages of the coins below 90%, suggesting a significant problem of reliability. Cowell instead used a different technique to analyse 28 cupro-nickel and bronze coins of Euthydemus II, Pantaleon, and Agathocles from the British Museum collection. He drilled into the edge of the coins removing about 10mg of metal which was then analysed by atomic absorption spectroscopy (AAS), a technique which has more recently been accepted as both accurate and precise.[345] Cowell also analysed two coins (one cupro-nickel and one bronze) under a scanning electron microscope reavealing 'numerous small sulphide inclusions throughout the sections on both coins'.[346] Such an uneven distribution of the elements is perhaps part of the reason for incorrect XRF results, since only a small area (often less than 5mm^2) of the surface is analysed using that technique. Cowell, whose results are the most trustworthy of the various analyses, found a mean nickel content of around 19%, greatly above the content found in the Chinese alloy, *pai t'ung* and much closer to Flight's original findings. There were also other differences, in particular a lack of lead and a higher nickel to cobalt ratio found in the coins.[347]

Cowell's conclusions based on his reliable results are very interesting. He found that the nickel present in the cupro-nickel coins was due to the use of a different nickeliferous ore for those issues than the ore used to produce the bronze coins. Even more intriguing is the difference in the quantities of the minor elements, in particular arsenic and iron, which Cowell found between coins with the two monograms  and  . This difference, he concluded, may have been the result of different smelting techniques used for the coins of each monogram. He used this

[343] Cowell (1986).
[344] For a discussion of this technique see Stos-Gale (1986).
[345] Ponting (2012), 21-22.
[346] Cowell (1986), 338.
[347] Cowell (1986), 340.

conclusion once again to rule out the possibility of the finished alloy having been moved to the Graeco-Bactrian kingdom from China.[348] Obviously such a conclusion strengthens the identification of these two monograms as the main control marks of Mints A and B and suggesting the two were geographically, or at least operationally separate.

Cowell suggested that the most likely source for this metal would have been 'a pyritic nickeliferous copper sulphide ore containing nickel arsenic minerals', although he was unable to identify a particular location for this source because of a lack of information.[349] It is quite possible that the source for this metal was a small, local one and used to extinction in antiquity, making finding it now impossible. There is anecdotal evidence for sources of nickel in Afghanistan.[350] Since Cowell's publication, however, geological surveys of Afghanistan have appeared. The most recent, conducted in 2008 indicates many possible sources of copper. [351] Unfortunately there is no evidence of any of these sources also bearing nickel in any significant quantity. The combination of elements in the ore identified by Cowell is particularly distinctive and there is no reason why further work could not establish a source, although this would mean extensive sampling of potential sources in Afghanistan and Pakistan, an expensive and currently dangerous undertaking.

Another series of results of scientific analysis of the cupro-nickel coins was published in 1989 by Barrandon and Nicolet-Pierre. The coins tested were part of the collection of the Cabinet des Médailles and were analysed using two different, non-destructive techniques: proton activation and neutron activation. The results confirmed the approximate levels of copper and nickel found in the coins by both Flight and Cowell.[352] Unfortunately the techniques used for the testing procedure were unable to identify the two minor elements (arsenic and iron) to a satisfactory level of accuracy, ruling out any possibility of corroboration for Cowell's finding of a different metallic composition for different monograms. There is, however, nothing to suggest that Cowell's results were incorrect and the limited results

[348] Cowell (1986), 343.
[349] Cowell (1986), 344.
[350] Humlum (1959), 305.
[351] Abdullah *et al.* (2008), 109-128.
[352] Barrandon and Nicolet-Pierre (1989), 62 fig. 3.

published by Barrandon and Nicolet-Pierre do not invalidate his findings. The original publication of the results had little historical interpretation and so it fell to Widemann to highlight the reduced proportion of nickel (7.5%) in one of the coins tested. This reduction was offset by an increase in the amount of lead (5%) and was suggested by Widemann, along with an overstrike of Agathocles on Euthydemus II to be an indication of 'les troubles qui semblent avoir marquée la fin du règne d'Agathocle.'[353] A much more wide-ranging analysis is required to confirm such a suggestion, of course.[354]

The most important question for our understanding of the numismatic evidence of this period is to consider how these cupro-nickel coins fitted into the systems of coinage of the three kings under whom they were minted. Cunningham's initial suggestion was that the innovative alloy was used, with its silver-white appearance, to produce coins that were the equivalent of obols.[355] When Cunningham proposed this interpretation he was unaware of any examples of silver obols of Euthydemus II, Pantaleon, or Agathocles, while there were a number of specimens of Antimachus I, Demetrius, and Eucratides available to him. This study, however, contains 22 obols of Euthydemus II, from an estimated 18.3 obverse dies, as well as a single obol of Pantaleon, all of whose coinage is known from very few examples. The situation remains the same now for Agathocles, however, with no evidence of the emission of obols during his reign. The table below shows the smaller denominations produced under each king.

Table 25: Distribution of smaller denominations.

King	AR Obol	CuNi Double	CuNi Unit	AE Triple	AE Double
Euthydemus II	●	●	●	●	
Pantaleon	●	●			●
Agathocles		●	●		●

[353] Widemann (2009), 100.
[354] Unfortunately a programme of analysis of this kind would be a significant undertaking, and to achieve meaningful results, particularly with reference to the minor elements, would require the use of a destructive technique, something which has obvious ethical problems.
[355] Cunningham (1884), 308.

Although the cupro-nickel coins have been the subject of much scholarly attention, since Cunningham the way in which these coins were valued in the system of denominations has only been properly addressed by Widemann, who, despite Cowell's analysis, returned to the theory of a Chinese source for the alloy.[356] He partially revised Cunningham's theory by suggesting that the cupro-nickel coins were originally introduced by Euthydemus II to deal with a financial crisis caused by the campaigns of Demetrius I. At the start of their production, it is claimed, the populace was given a free choice between obols and double unit cupro-nickel issues, which although they were not silver still held an intrinsic value, partially enhanced by their distant origin. Widemann insists that there was an established market for the cupro-nickel alloy in Taxila prior to the introduction of the coins, a feature that would have helped to maintain their value and make them worth more than their bronze equivalents and is supported by the identification of the cupro-nickel alloy in jewellery from the city. The lack of obols under Agathocles is portrayed as the natural conclusion of the financial difficulties that had grown steadily worse under his predecessors, meaning that the smallest silver denominations role in the system of coinage was taken by the cupro-nickel issues.

Such an analysis is overly complicated. On the basis of Cowell's results the suggested Chinese origin of the cupro-nickel alloy can be rejected. Instead the metal simply came from a 'nickeliferous copper sulphide ore'. The initial discovery of nickel in the West in 1751 came about when an ore of that element was mistaken for copper.[357] It is possible that the ore that was used to produce the Graeco-Bactrian coins was simply from a different source of copper, with no implications of increased or intrinsic value. The different appearance of the cupro-nickel coins was simply a side-effect of the use of a different source of metal, perhaps one local to Taxila, since artefacts with a similar composition were found there.

The suggestion that these coins had a higher value than their copper equivalents is based solely on the colour of the metal, one that looks whiter and is therefore assumed to be an attempt to simulate the appearance of silver in much the same way as the orichalcum sestertii introduced under Augustus had the fleeting

[356] Widemann (2009), 107.
[357] Flight (1868), 307.

appearance of gold.[358] Such an interpretation ignores the fact that the Graeco-Bactrian kingdom had a clear division between the types used for precious metals and those on base metals. Since the time of the Diodoti, the king's head had appeared on the obverse of gold and silver coins, while bronze coins usually featured the head of a deity on the obverse. The cupro-nickel coins, whether those of Euthydemus II with Apollo on the obverse, or those of Pantaleon and Agathocles with Dionysus, fall into the pattern of the base metal types. Indeed, under all three kings bronze coins were produced with the same types as the cupro-nickel issues, and as we shall see later, perhaps with dies intended for the production of either metal. Not only were coins produced in different metals with the same type, but their denomination appears to have been the same, since under Pantaleon and Agathocles the double denomination was produced in both cupro-nickel and copper. If a new denomination with an inflated value were to be introduced it is highly unlikely that the types chosen to appear on it would be the same as the copper coins. Such a similarity would have been the cause of much confusion in circulation, particularly if the users of the coins had been expected to substitute them for silver, with its intrinsic value.

The most likely explanation for these cupro-nickel coins is also the most banal. They do not reflect financial difficulties in the Graeco-Bactrian kingdom, nor a shortage of silver. Instead they were produced using metal from a supply that had a different composition from previously mined copper ores. The source of the metal was perhaps not a substantial one, which would explain why these coins were produced under only three kings. Other hypotheses may be more attractive and give more room for potential insight into the history of the kingdom, but they are unnecessary when such a simple explanation fits the evidence so well.

[358] Wolters (2012), 336.

Table 26: Base metal issues of Euthydemus II.

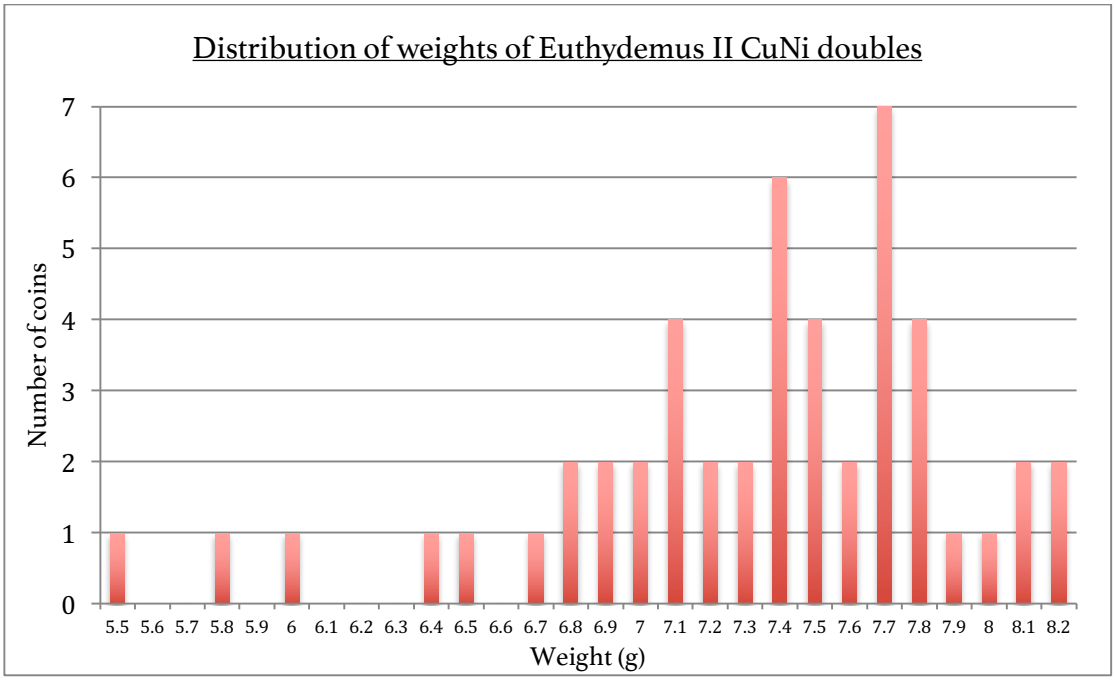
Denomination	Number of examples (n)	Weight range (g)	Mean weight (g)	Standard deviation	n/obverse dies	Estimated number of obv. dies	Monograms
Monolingual							
CuNi Double	48	5.79-8.46	7.57	0.58	1.5	105.6	
CuNi Unit	8	1.42-3.73	3.13	0.94	1.8	9.3	
AE Triple	18	6.20[359]-12.79	11.19	0.81	6	3.6	

The results of the die study show the three denominations of base metals produced under Euthydemus II to be significantly different from one another. The usual problem that has been encountered with bronze coinage throughout this study is exacerbated when attempting to establish die identity between cupro-nickel coins. The coins are often quite worn and regularly heavily corroded making the finer details of the type very difficult to distinguish. The obverse head of Apollo, for example, posed particular problems. It was necessary to compare small details in the hair, which is depicted falling down behind the head with a number of curls in the locks. Such detail was unfortunately obliterated on many examples. It may be, therefore, that the n/d values for the cupro-nickel coins have been slightly depressed by the difficult in identifying firm links.

Cupro-nickel double units

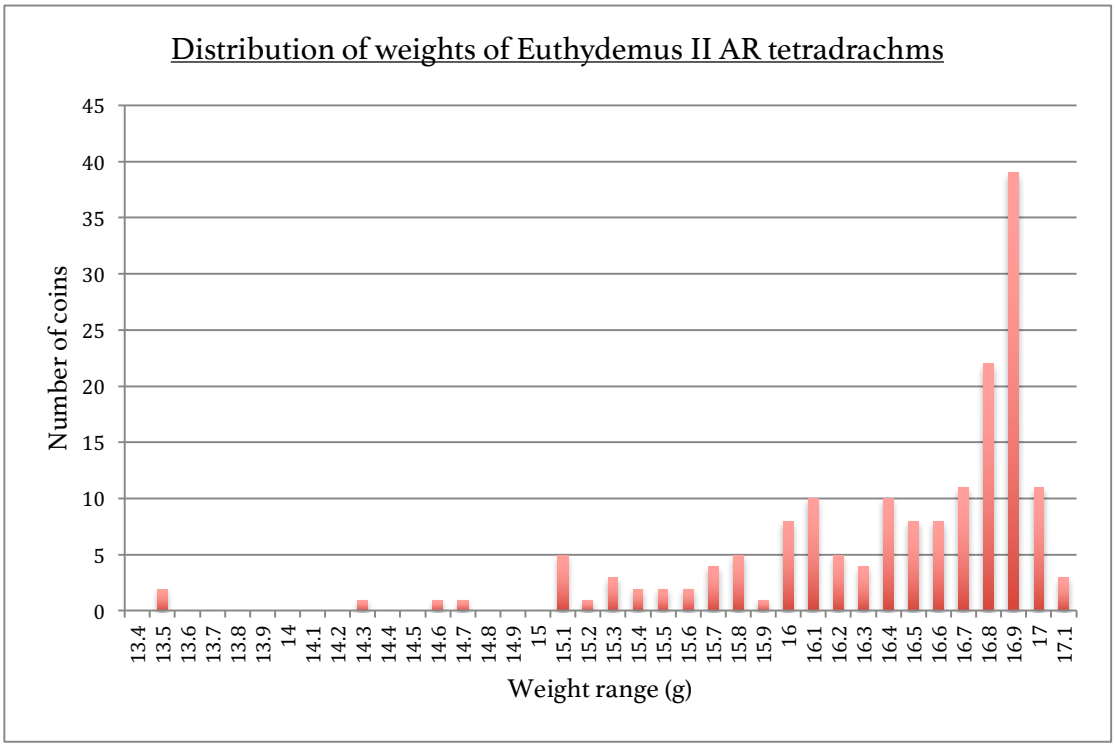
The current study contains 48 examples of the cupro-nickel double denomination with a mean weight of 7.57g, a figure significantly lower than the 8.4g given by Bopearachchi.[360] 8.4g is, of course, the theoretical weight that would be the equivalent of two Attic drachms and perhaps suggest an integration of some sort into the system of silver denominations. When a histogram of the weights of the coins in the study is drawn, however, the weight that the mint seems to have been aiming for is around 7.7g.

[359] This coin (*SNG* ANS 229, Col. Biddulph coll. 1923) was deliberately cut in two with only one half remaining. It has been omitted from the calculations of mean and standard deviation for the AE triple denomination.
[360] Bopearachchi (1991), 170.



It is very difficult to know exactly what weight these coins had when they were made because the level of corrosion has, in many cases, removed a significant proportion of the coins' original mass.[361] Bopearachchi's suggestion of 8.4g does, nonetheless, seem too high, with the heaviest coin in the current study weighing 8.46g. It is far more likely that the mint was aiming for a lower weight, although since the alloy was not considered to have intrinsic value of its own the accuracy of the weight would not have been an important issue. It would have been enough simply for the users to distinguish between the 'double' coins and those half their weight, the 'units'. The bronze doubles issued under Demetrius I had a similar average weight of 7.56g, although their distribution looks quite different, perhaps with an intended weight of around 8g. Rather than any sort of agendum of financial saving through weight reduction, this may provide an indication as to the original weight of the cupro-nickel double coins; it is quite possible that these coins have lost at least 0.5g through the heavy corrosion of the last 2,200 years and they were originally struck to a weight standard closer to 8g.

[361] The question of the percentage of the total weight lost in a series of coins since its production through circulation and the circumstances of its deposition, is a thoroughly debated one. Various figures have been proposed for gold and silver coins. Mørkholm (1982) suggested a loss of 0.5% for gold and between 1 and 1.5% for silver, the lower value being due to its more limited circulation. These estimates came from Hill (1924): 1%, Naster (1948): 1.5%, and Le Rider (1977): 0.5-1%. The different qualities of the cupro-nickel alloy make a higher rate of loss more likely.



The accuracy with which the weights of the various coinages were attained by the mint may indicate which metals were considered to have an intrinsic value. A histogram of the weights of the tetradrachms of Euthydemus II is included above. The chart has a clear peak of coins that have weights that fall between 16.8 and 16.9 grams, above which there are very few examples, while below that weight range there are many coins. The shape of this curve indicates that the mint aimed for a specific weight, perhaps around 17 grams, as indicated by the peak and taking into account a slight decrease in the weights of the coins brought about by circulation or corrosion. Coins produced with a weight above this were unacceptable to the mint and so were either melted back down or perhaps clipped in some way to remove the excess metal. In this way no potential revenue was lost through coins that weighed more than they needed to. On the other hand, the production of coins slightly under the weight was little cause for concern at the mint and examples that fall into this range were perhaps augmented by the over zealous reduction of coins that originally weighed more than the intended weight. The histogram of the weights of the cupro-nickel doubles above looks quite different, with an aimed for weight of perhaps around 8 grams or slightly lower. Although the number of examples is much smaller this chart seems to suggest that the mint did not have the same aversion to producing coins that weighed slightly more than the target

weight. Looking at the standard deviations of different denominations normalised for their weight gives a similar impression.

Table 27: Accuracy of weights under Euthydemus II.

Denomination	Standard deviation / weight
Silver	
Tetradrachm	0.04
Drachm	0.06
Obol	0.06
Cupro-Nickel	
Double	0.08
Unit	0.3
Bronze	
Triple	0.07

The variation of the weights for the silver coins is lower than that for the cupro-nickel and copper coins strongly indicating that the copper and cupro-nickel coins were treated differently from silver since neither were considered precious metals.

The cupro-nickel doubles were struck with three different monograms: , , and . The first two are clearly very close in formation, much like the similarity between and as seen on the tetradrachms, with an additional line added to a monogram attested elsewhere. For the study the coins of this denomination have been split into two groups, with one subgroup. The coins of Group I have on the reverse, those of Group II, , and finally the issues of Group III feature on the reverse. The evidence from Cowell's analysis of the cupro-nickel coins of Euthydemus II as well as Pantaleon and Agathocles indicated that the metal of the coins with was prepared in a slightly different fashion from that used to strike coins with . The previous division into two mints will therefore be employed here.

Table 28: Euthydemus II cupro-nickel double die statistics.

Type	n	d_o	n/d_o
Group I	26	19	1.4
Group II	16	9	1.8
Group III	6	5	1.2
Totals	48	33	1.5

Monogram	n	d_r	n/d_r
	26	26	1
	16	15	1.1
	6	6	1
Totals	48	47	1

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Figure 85: Obverse dies of Euthydemus II cupro-nickel doubles of Group I ().

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Figure 86: Obverse dies of Euthydemus II cupro-nickel doubles of Group II ().

Although the coins are in a poor state of preservation, it is possible to identify the same hand at work on the coins of these two groups, suggesting both should be attributed to Mint A. The strands of hair that fall down Apollo's neck are very often curved in a similar way. For example the coins at the far left and far right of the top row of **fig. 86** both have a double 's' shape in the strand of hair that comes down below the deity's ear, a feature that was probably engraved in this fashion due to the preference of the original engraver. The same distinctive shape is also visible on some of the dies of Group I illustrated in **fig. 85**. Although all the dies of Groups I and II were not cut by a single engraver, it does seem likely that at least some were produced by the same hand, probably indicating a shared location of production. Once more the small change in the monogram does not necessarily seem to have been reflected by the use of different personnel in the mint. It may instead reflect a batch number of some sort, or perhaps a similar minor change in the process of production.

The dies of Group III, with the  monogram do not, on the other hand, seem to share the engravers with those of Groups I and II. Illustrated in figure 15 they certainly do not have the double 's' shape in the trailing hair, and seem to have quite a different appearance of the face with a much smaller, and shallower eye on the dies as opposed to the almond-shaped, almost bulbous eye of the previous groups. In combination with the evidence of Cowell's analysis it seems that these coins were produced by a different mint than those of Groups I and Ia. This difference between monograms should not come as a surprise since it mirrors the evidence of the same monograms on the silver coins of Euthydemus II.

Figure 87: Obverse dies of Euthydemus II cupro-nickel doubles Group III ( *).*

One of the results of the die study that is surprising, however, is the relative size of the output of this denomination of cupro-nickel coins. The estimate for the number of obverse dies used in the production of the doubles is 105.6, almost twice the estimate for the tetradrachm dies of Euthydemus II (55.4).[362] As mentioned above the task of establishing die links between the cupro-nickel coins is a particularly difficult one and may have led to an inflation of the number of dies, but even so such a large number is astounding and indicates a significant coinage.

Cupro-nickel units

There are only eight cupro-nickel units in the current study, one of which was so poorly preserved that it was illegible and was therefore excluded, but the weight recorded. The seven examples had an n/d of 1.8 making it impossible to estimate the size of the coinage with any confidence. Based simply on the number of examples available it is likely that the output was significantly smaller than the 105 dies used for the production of the doubles. All eight coins bear the  monogram of Mint A, perhaps indicating that the single unit cupro-nickel coins were struck in small numbers at only that mint in much the same way as the hemidrachms may have been produced. With such limited evidence it is difficult to draw further conclusions about this denomination.

Bronze triple units

In addition to the two denominations struck with the cupro-nickel alloy the output of the mints under Euthydemus II included a triple unit bronze denomination. These coins were once again struck with only the  monogram and are therefore to be assigned to Mint A. The study includes eighteen coins of this denomination, which with an n/d of 6, are an excellent sample of the original coinage. The estimated number of obverse dies originally used in the production is 3.6. In comparison with the output of the cupro-nickel double unit coins, this is a very small number.

[362] With an n/d of 1.5 the estimate is far from reliable, but it is clear that the output of this denomination was large.

Figure 89: Bronze triple unit of Euthydemus II, 11.78g (Ashmolean, Shortt Bequest).

The coins of this denomination all have a feature that is rather unusual in the Graeco-Bactrian series of coins. On the obverse the size of the bust and dotted border does not fill the flan of the coin, with a substantial area outside the border. This feature is particularly clear in **fig. 89**, which illustrates the four obverse dies identified for this denomination. The distance between the two sides of the dotted border on the coins I was able to examine first hand was consistently 20mm, the same as the distance on the cupro-nickel double coins. There are, however, no die links between the two denominations, and although it seems that dies originally produced with the intention of striking double unit coins were instead used to mint a triple denomination, with proportionally wider flans, the size of the bust of Apollo itself is always smaller on the triple units, perhaps indicating that the dies were not all engraved at the same time.

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Figure 88: Obverse dies of Euthydemus II AE triples.

This feature is not mirrored on the reverses of these coins. Here the dies are appropriately sized for the diameter of the flan of the triple denomination, with the tripod and legend filling much of the surface of the coins. This difference indicates that the reverse dies were cut separately from the obverses to suit the larger flans.

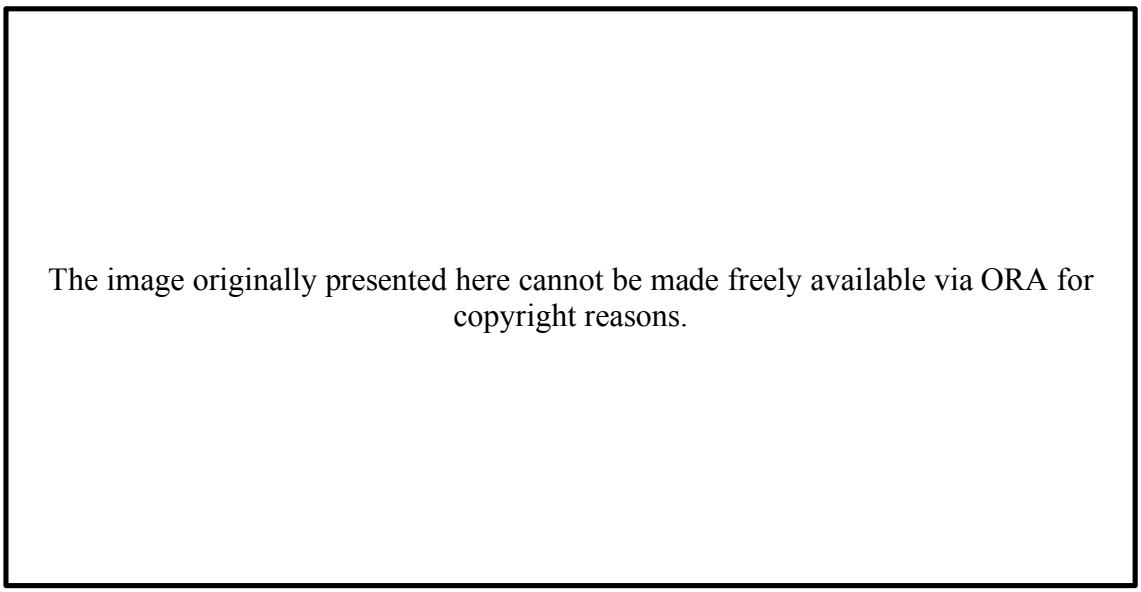


Figure 90: Reverse dies of Euthydemus II AE triples.

Summary

There is clear evidence of the continuation of coin production at Mints A and B under Euthydemus II, carrying on the system that had been used by Demetrius, with the vast majority of coins carrying the  or  control marks. The types of these coins remained consistent preventing any clear chronological divisions. The size of the output of both mints was smaller than it had been under Euthydemus' predecessor, Demetrius. The tetradrachms of Mint A seem to have been produced quickly, with two separate workstations identified, from dies engraved by a single craftsman. At Mint B, however, the work of multiple engravers can be seen, perhaps indicating that production did not take place over such a short period of time. Production of silver denominations was undertaken at both mints in the usual denominations of tetradrachm, drachm, and obols. In addition to this a small number of hemidrachms was produced at Mint A.

The single innovation in the system of coinage of Euthydemus II was the introduction of a new cupro-nickel alloy used for the flans of double and unit coins. These coins used the typology of base metal coinage, and, based on the metrological analysis presented here, were not considered to have an intrinsic value by the mints. The most likely explanation for the appearance of this different alloy is that it indicates a different source of metal, which was initially mistaken for copper. As often in this study, such an explanation leads much of the previous historical reconstruction of the kingdom to be dismissed, although the potential for identifying the location of this alloy is high and would give substantial insight into the kingdom under Euthydemus II.

Figure 91: System of production under Euthydemus II.

Chapter VII: Pantaleon and Agathocles

We come now to the coins of Pantaleon and Agathocles, which share a number of similarities. The obverse portraits on the tetradrachms and drachms of the two kings are very close in the way they depict certain facial features of the two rulers (**fig. 92**). This close resemblance between the two kings has been used to suggest that they were related in some way, probably being brothers.[363] Such an interpretation is clearly highly problematic. As well as the portrait the reverse types are also very similar. Both show Zeus, a deity who had been absent from Graeco-Bactrian tetradrachms since the Diodotids. However, on the coins of Pantaleon and Agathocles, Zeus is shown holding Hecate, who herself holds two torches, rather than the famous image of the god hurling a thunderbolt of the first independent Bactrian coins.

The similarities between the two kings' coins are not limited to the tetradrachms and drachms that were produced during their reigns. The cupro-nickel coins that had first appeared under Euthydemus II continued to be struck, although with different types used under Pantaleon and Agathocles: a bust of Dionysus on the obverse, and a panther on the reverse (**fig. 93**). An even more radical departure from previous Graeco-Bactrian coinage was the introduction of square bronze coins with both Greek and Brahmi legends. Until this point the coins of the Graeco-Bactrian kingdom had conformed to the Hellenistic model; their legends were written only in Greek, with a Greek deity featured explicitly on the obverse with an attribute on the reverse. Under Pantaleon and Agathocles this model continued to be used with the cupro-nickel issues mentioned above, while a small number of bronze coins featuring the same types was also produced.

[363] Tarn (1951), 77; Narain (1957), 59.

Figure 92: Tetradrachms of Pantaleon (top) and Agathocles (bottom) (Ashmolean).

The image originally presented here cannot be made freely available via ORA for copyright reasons.

Figure 93: Double unit cupro-nickel coins of Pantaleon (top) and Agathocles (bottom) (BM 1888.1208.109 & Ashmolean).

In addition to these Attic standard circular coins, both Pantaleon and Agathocles produced square bronze standard issues on an uncertain weight standard (**fig. 94**). On these coins a goddess appears on the obverse, accompanied by a Brahmi legend, while the reverse is taken up by a panther and the usual legend in Greek. The garments worn by the goddess as well as her hairstyle and the dancing movement she appears to be making have all been identified as Indian.[364] This was the first time that a language and iconography other than Greek had appeared on the coins of the Graeco-Bactrian kingdom. The different weight standard and form of these bronze coins surely indicates that they were intended for a different group of users who were familiar with the Indian tradition in which coins were square. It has therefore usually been suggested that Pantaleon and Agathocles were ruling in areas south of the Hindu Kush, since this iconography and shape of the flans fits better into a pre-existing tradition.[365] Such a conclusion is highly likely to be correct, although in the absence of find spots for these coins it is impossible to suggest a particular region over which the kings may have ruled. It may be possible that the minting of such coins does not suggest direct rule over Indian areas, rather that the coins were produced for trade with areas in which the Indian tradition of coinage was dominant. Elsewhere in the Hellenistic world, however, bronze coins rarely circulated outside the area controlled by the issuing authority, since lacking precious metal content, they would have required that authority to remain monetised.[366] Whatever the case, these square bronze issues are a remarkable departure from the previous output of the Graeco-Bactrian kings, and the successors of Pantaleon and Agathocles continued to make Indian standard square coins until the fall of the Indo-Greek kingdom in the first century AD.

Tarn identified Pantaleon and Agathocles not only as brothers but more specifically as sons of Demetrius and saw them as 'sub-kings' ruling the Paropamisadae for their father.[367] It is unclear exactly how Tarn envisaged the role of 'sub-king' would have worked. The similarity between the coinages of Pantaleon and Agathocles, a feature which distinguishes their issues from the other kings of the Graeco-Bactrian kingdom, does suggest a relationship between the two that was different from the usual progression from one king to another. Coins issued by

[364] Bopearachchi (1991), 176.
[365] Tarn (1951), 95.
[366] Mørkholm (1991), 6.
[367] Tarn (1951), 95; 156.

consecutive kings often feature the same deity, although rarely in such a similar way as the issues of Pantaleon and Agathocles. Although, for example, the silver coins of both Euthydemus I and Demetrius depict Heracles on the reverse, the hero is seated on a rock in Euthydemus' output and shown standing crowning himself on that of Demetrius. Here the repeated appearance of Hecate along with Zeus on Pantaleon and Agathocles's silver tetradrachms and drachms is quite different. Although Zeus is seated on a throne on Pantaleon's coins and standing on Agathocles's, the images, in concert with the similarities in obverse portrait, are the closest shown on coins of different Graeco-Bactrian kings.

Figure 94: Square issues of Pantaleon (top) and Agathocles (bottom) (Ashmolean)

Chronological indicators

The only evidence we have for the existence of Pantaleon and Agathocles is numismatic. One feature of their coins suggests that Pantaleon and Agathocles must be placed before Antimachus. At some point in the production of Agathocles' tetradrachms an epithet was introduced in the reverse legend. Up to this point Graeco-Bactrian coins had only featured the name of the king along with the royal title, while from Antimachus on epithets were always included in the legend. It seems highly likely then that the coins of Agathocles were produced before those of Antimachus, by which point it had become common practice to include an epithet. Finally there is one other chronological indicator suggested by the coins. The 'pedigree' coins produced by Agathocles using the types of previous kings, and even Alexander the Great, include an issue with the types and legend of Pantaleon, making it logical that his coins were produced before those of Agathocles.

Pantaleon

Table 29: System of coinage under Pantaleon.

Denomination	Number of examples (n)	Weight range (g)	Mean weight (g)	Standard deviation	n/obverse dies	Estimated number of obv. dies	Monograms
Monolingual							
AR Tetradrachm	5	15.02-16.57	15.97	0.60	2.5	3.3	
AR Drachm	1	3.89	n/a	n/a	n/a	n/a	
AR Obol	1	0.59	n/a	n/a	n/a	n/a	-
CuNi Double	13	6.23-8.28	7.31	0.78	1.4	n/a	
AE Double	4	7.70-8.22	7.93	0.22	2	n/a	
Bilingual							
AE Square	46	7.3-13.16	11.60	1.05	2.1	30.2	-

Of all the six kings included in the die study, examples of Pantaleon's coinage are by far the smallest proportion. His seemingly small output did not escape the notice of Tarn who used it in his historical narrative as indicative of a short reign.[368] Only five examples of the king's tetradrachms are known, and although it is dangerous to base conclusions on such a small number, it is very likely that the original output was relatively small, with perhaps as few as three obverse dies being used in the production of the denomination. Only one monogram () appears on the silver coins, meaning they should all be assigned to Mint A.

As for the system of coinage as a whole, under Pantaleon the output of denominations remained almost unchanged from Euthydemus II. The only addition to the range of coinage was the introduction of the square bronze issues with bilingual legend. Of these coins the study contains 46 unique examples, all of which lack monograms, suggesting a different system of production, most likely taking place away from Mint A. Such a number is not an entirely unrepresentative sample and can allow meaningful conclusions. The n/d value for this denomination is 2.1, allowing an estimate of the number of dies originally used in the production of the denomination. As opposed to the silver, it seems that the bronze was

[368] Tarn (1951), 157.

produced on a larger scale, with at least 30 obverse dies used in its production. As a new denomination it would presumably have been important to make a substantial number of the coins, whereas it seems likely, on the basis of the large output of earlier kings, as well as hoard evidence, that the number of tetradrachms and other silver denominations in circulation would have remained high.

The bilingual bronze issues also have a much larger variation in weight than the monolingual bronze coins, with a standard deviation of 1.05 as opposed to 0.22. A lack of precision in the weight of bronze coins is not surprising since inaccuracy did not have as costly implications as variations in the weight of precious metal issues. Such a difference in accuracy between bronze denominations is striking and, based on the appearance of the Indian standard coins, is probably due to the different production methods involved. The flans for the monolingual coins were produced in the usual Greek fashion of casting in moulds, which led to a consistent circular shape for the flans. The bilingual bronze issues, however, were cut from prefabricated bars of metal. The example illustrated above (**fig. 94**) shows the very different standard in the outcome of the striking of these coins. The square coins are very often struck off-centre, and of a highly irregular shape, sometimes even with the line for the intended edge of the coin ignored when it was cut out (clearly visible on the Agathocles coin in **fig. 94**). Such a careless approach to striking and the production of the flans in general is not to be found on the silver or cupro-nickel issues of Pantaleon, or on coins of earlier Graeco-Bactrian kings. Very rarely are coins not struck centrally with the full surface of the die visible on the coin. These coins also lack the monograms that appear on the monolingual issues. Such differences in methods of production, and the application of the control mark, strongly suggest that these bilingual coins were not produced by the same mint, or even under the same system as the monolingual issues. If these coins were then struck in a different location from the Attic standard coins, it seems likely that they would have been produced in the area in which they were intended for circulation, where the different techniques used in their production had been in use for some time.[369]

[369] Bopearachachi and Pieper (1998), 199.

The die analysis undertaken here allows the size of Pantaleon's coinage to be confirmed for the first time; the suggestion that the output seems small to us because relatively few of the king's coins survived can be refuted on the basis of the estimates given above for the original number of dies. These numbers (3 or 4 obverse tetradrachm dies and 30 obverse dies for the square bronzes) are by far the smallest of the coinages of the six kings in this study. The size of Pantaleon's coinage does not appear small because of poor preservation, rather the original output was tiny in comparison with other kings.

In view of this small output, a short reign for Pantaleon seems quite plausible: the king simply did not have time to preside over the production of a large coinage. The similarity of the types, and in particular the obverse portraiture, between Pantaleon and Agathocles, can perhaps also be useful here. As we have seen, the traditional explanation for the closeness of the two kings' coinages has been to suggest that they were related, and were ruling at the same time, perhaps as 'sub-kings' under another sovereign. It seems just as plausible to suggest that, given the seemingly short reign of Pantaleon, the similarity is actually the result of a continuation in the output of the mint. The obverse portraits of the two kings may look similar simply because they were produced by the same die engraver, or from the same portrait model; a genetic relationship cannot be inferred purely on the basis of these common features. The continued use of the same monograms hints at a similar situation. Whatever the complete interpretation of the monograms it seems quite likely that they represent personnel involved in the striking of the coins, probably the official responsible for the production. The continuation of the same monograms across the issues of Euthydemus II, Pantaleon, and Agathocles therefore suggests a perpetuation in the administrative systems of the mint during the reigns of these three kings. Of course, this evidence could also indicate that the coinages were being produced simultaneously, although it seems very unlikely that three individuals who all identified themselves as βασιλεύς would be producing coins at the same time and at the same mint. As we shall see there is evidence under Antimachus for the continuation of minting practices from a previous king in the early part of his successor's reign. The similarity between the obverse portrait of the later coins of the Diodotids and the earliest issues of Euthydemus I indicates a similar continuity.

It is also worth considering that the similarity of the obverse portrait on the silver issues of Pantaleon and Agathocles is that the image on Agathocles' coins is actually a posthumous portrait of Pantaleon. Such a phenomenon is not uncommon elsewhere in the Hellenistic world. The production of posthumous Alexander coins is a special case, but illustrates that mints had no difficulty producing coins that did not reflect the true issuing authority. The production of coins with the types of Philip II continued under Alexander and even extended to 315, eight years after the latter's death.[370] A closer comparison can be found at Antioch under Seleucus II when a group of coins was issued with the types and legend of Antiochus I, although the royal title was omitted.[371] The most extreme example of the use of posthumous portraits is that of the Attalids on whose coins the types of the founder of the dynasty, Philetaerus, appeared for over one hundred years after his death.[372]

As we shall see later, however, when kings were depicted posthumously, as on the 'pedigree' coins of Agathocles and Antimachus, their name appeared in the legend without the royal title.[373] The similarities between the portraits of Pantaleon and Agathocles should be seen in the context of the many other similarities between their coin types, and therefore as a simple continuation.

Summary

The silver coinage of Pantaleon, based on the evidence of the die study, was genuinely small in comparison with that of other kings and was produced at a single location, Mint A. At the same time a new denomination was introduced, that of the square Indian standard bronzes, for the first time in the Graeco-Bactrian kingdom making use of legends in a language other than Greek, and most likely produced elsewhere. The number of dies used in the production of this denomination, however, was not insignificant. It is no longer tenable to suggest that Pantaleon reigned for a short time only on the basis of his coinage. The difference in output between the monolingual and the bilingual coins is perhaps more likely

[370] Le Rider (1993).
[371] Le Rider (1999), 74-84.
[372] Westermark (1961); Meadows (2013), 154-181.
[373] Glenn (2014), 54.

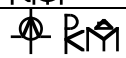
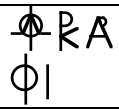
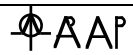
to indicate that Pantaleon's reign was centred on the area south of the Hindu Kush, a region which was familiar with the shape and iconography of the new denomination.

Agathocles

As we have seen, the coinage of Agathocles shares many similarities with that of Pantaleon. The portrait and appearance of Zeus and Hecate on the monolingual silver coins, as well as the striking of cupro-nickel coins with Dionysus and panther types are features carried over from the coinage of his predecessor. There are, however, noticeable differences between the two systems of coinage as a whole. As far as we know Agathocles did not produce obols, although a small number of contemporary imitations exist. The production of cupro-nickel coinage was also expanded with the inclusion of the single unit denomination. For the first time an issue was produced with no clearly identifiable Greek iconography, using precious metal on a non-Greek standard and on square flans. The final change was the introduction of a series of tetradrachms issued with coin types copied from those of previous kings, with a change in the construction of the legend. These are the so-called 'pedigree' coins and have been among the most fertile of sources for historians of this period.

System of Coinage

Table 30: System of coinage under Agathocles.

Denomination	Number of examples (n)	Weight range (g)	Mean weight (g)	Standard deviation	n/obverse dies	Estimated number of obv. dies	Monograms
Monolingual							
AR Tetradrachm	202	14.50-19.87	16.39	0.60	5.9	42.4	
AR Drachm	23	3.68-4.24	4.03	0.15	1.8	29.9	
CuNi Double	68	5.96-8.89	7.66	0.56	1.2	n/a d=43	
CuNi Unit	16	3.38-4.08	3.66	0.23	1.1	n/a d=12	
AE Double	5	5.20-8.36	7.36	1.28	1	n/a[374] d=4	
Bilingual							
AR Square 'Drachm'	7[375]	2.33-3.31	2.87	0.40	2.3	5.3	-
AE Large module	59	9.55-16.54	12.17	1.6	2.7	28.8	-
AE Small module	8	4.28-6.00	5.28	0.58	2.7	4.8	-

Tetradrachms

Unlike the previous kings, the organisation of whose coinage was based on the different portrait models or monograms, it is possible to identify three distinct series in the production of the tetradrachms of Agathocles, and to place them in chronological order. The first two series use the usual Hellenistic model of royal coinage, with a portrait of the king on the obverse and Zeus holding Hecate on the reverse of the coins. The legend on the coins of Series One reads: ΒΑΣΙΛΕΩΣ ΑΓΑΘΟΚΛΕΟΥΣ. Series One is subdivided into two groups based on the monograms. The second series features the face types although the legend now reads ΒΑΣΙΛΕΩΣ ΑΓΑΘΟΚΛΕΟΥΣ ΔΙΚΑΙΟΥ, while the coins of the third series are the 'pedigree' issues which make use of obverse and reverse types of previous kings. A transitional group also exists with features from both of the first two series. This group, in addition to the appearance of the epithet on the coins of the second

[374] Four dies of Dionysus type identified; one of Zeus.
[375] One coin was excluded from the die analysis (see below).

and third series indicates that the coins of Series One were the first of Agathocles' issues to be struck.

Table 31: Agathocles standard tetradrachm die statistics.

Obverse	n	d_O	n/d	D_O
Series One Group I	92	11	8.4	12.5
Series One Group II	2	2	1	n/a
Transitional	3	1	3	1.5
Series Two	11	3	3.7	4.1

Monogram	n	d_r	n/d_r
	92	43	2.1
	1	1	1
	1	1	1
	3	2	1.5
 ΔIKAIOY	11	8	1.4

The above table shows the relative sizes of the different groups of the first two series (the pedigree coins will be discussed separately). Group I is by far the largest group, and is very well represented in comparison with the coins of other kings in this study with an n/d of 8.4, giving much confidence to the obverse die estimate of 12.5. The three remaining groups are unfortunately poorly represented, although it is highly likely that they are much smaller in terms of output than the first group.

Series One ( ,  , )

Figure 95: Tetradrachm of Agathocles Series One, 16.74g (BM 1888.1208.115).

The obverse depiction of Agathocles remains consistent in displaying the same features throughout the coins of Series One. **Fig. 96** shows all the obverse dies used to mint tetradrachms of Series One that have been identified in this die study. The king's facial features and hair are always depicted in a similar fashion. For example, the area of hair behind the king's ear and below the diadem always seems to be made up of two rows of locks of hair, with the top row consisting of four strands, and the bottom row three. The king's ear is also engraved in a consistent manner, with a thick outline and a relatively large ear lobe. Although it is, of course, very difficult to identify the work of particular die engravers on coins which have undergone various levels of circulation, and therefore present many different patterns of wear, it is very likely that these twelve dies were produced by the same hand. With the exception of the five coins below all the examples of Series One feature the monogram  , indicating a production at Mint A.

Figure 96: Obverse dies of Agathocles Series One Group I and transitional group tetradrachms.

We have already seen examples of the use of multiple workstations in the production of coins of earlier kings. This phenomenon is also to be found in Series One Group I (**fig. 97**). Here two separate anvils have been identified. This is evidence of an increased speed of production, at the start of Agathocles' output, a feature we shall also find in Antimachus' early coinage.

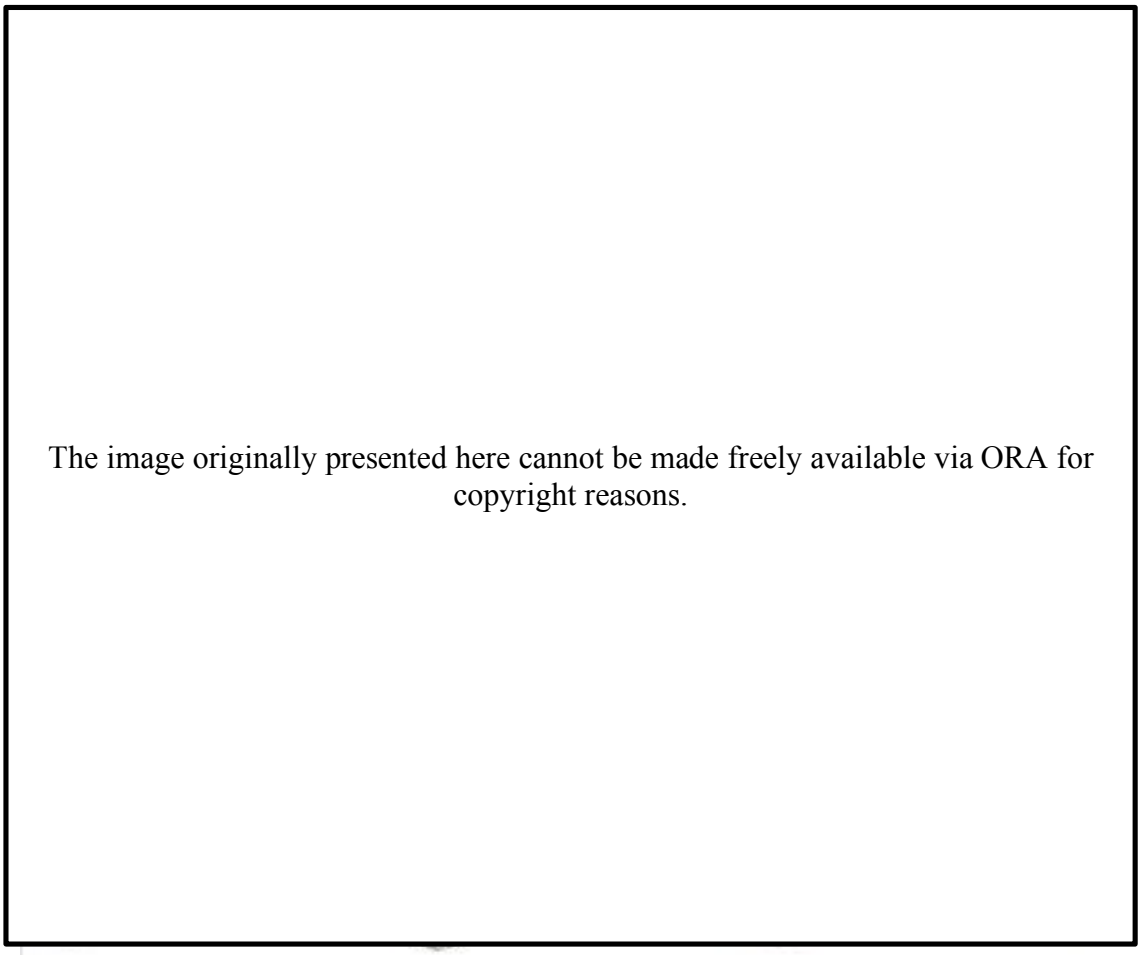


Figure 97: Die group of Agathocles Series One.

Before moving on to the second series of tetradrachms, it is worth noting two coins that fit within Series One, but which feature two different monograms (Α and ΑΡ).[376] Both coins appeared in recent auctions and no further examples exist in other collections. The portraits of the king on the obverse of these coins are very close in style to those of Group I. The reverse type is noticeably poorer, however, with a much less precise depiction of Zeus and Hecate. The recent appearance of these coins, using monograms that are known from other denominations of earlier kings, may be considered suspicious, but they have been included here with that

[376] CNG 23rd May 2007, 626; Spink 28th March 2012, 124.

caveat. If genuine, they should be tentatively assigned to Mint A on the basis of the obverse style.

Series Two (P)

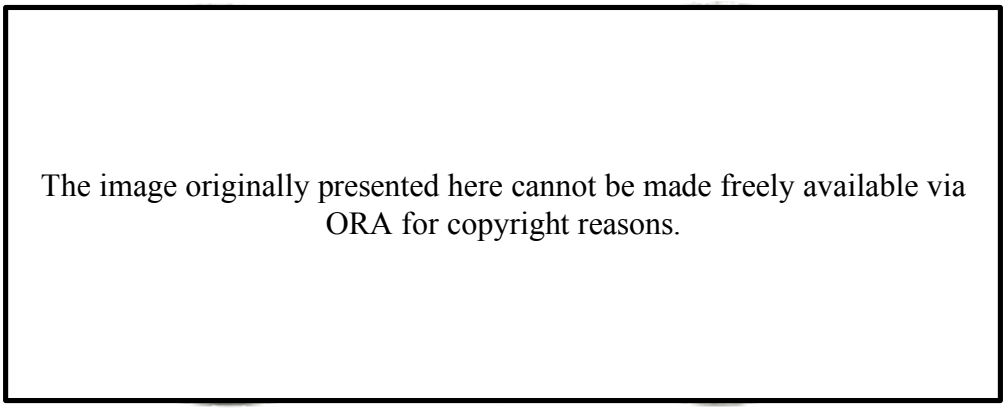


Figure 98: Tetradrachm of Agathocles Series Two, 16.83g (BM 1953.1014.2).

The second series features a very different style of obverse portrait, although probably based on the same model, as well as an additional word as part of the reverse legend, which now reads: ΒΑΣΙΛΕΩΣ ΑΓΑΘΟΚΛΕΥΣ ΔΙΚΑΙΟΥ, 'of king Agathocles *Dikaios*. The addition of an epithet is unusual in the Bactrian tradition of coinage, since none of Agathocles' predecessors (here assumed to be: Diodotus I and II, Euthydemus I and II, Demetrius, and Pantaleon) used such a device on their own coinage. Although these kings did not include epithets, the so-called 'pedigree' coins produced under Agathocles (Series Three) have legends that include epithets for Antiochus (*Nikator*), Diodotus (*Soter* and *Theos*), Euthydemus (*Theos*), Demetrius (*Aniketos*), and Pantaleon (*Soter*). The reason for the appearance of the epithet on these coins is unclear, although it does perhaps come from an increasing use of epithets by Seleucid kings in the third century.[377]

The epithet is very useful for putting the two series into a relative order, one of the few times that such a chronological distinction is possible within a single king's coinage. It seems highly likely that the addition of an epithet would occur after the production of coins with a simpler legend. Once introduced it is hard to envisage

[377] Callataÿ and Lorber (2011), 434-449.

the epithet being removed from the king's coins. Such a situation is found on the coins of the later Graeco-Bactrian king Eucratides I. The first series of the king's coins appear with a simple legend reading ΒΑΣΙΛΕΩΣ ΕΥΚΡΑΤΙΔΟΥ. Later the legend is changed to read ΒΑΣΙΛΕΩΣ ΜΕΓΑΛΟΥ ΕΥΚΡΑΤΙΔΟΥ. Accompanying the additional word the obverse type changes from the usual Hellenistic style bust of the king wearing the diadem, but otherwise bare-headed, to the king wearing a Boeotian helmet.[378] As with Agathocles it seems very unlikely that once an epithet had been adopted, that it would be dropped on later coins minted under the king and more importantly the coins of all the successive kings include this feature.

Once again the three dies used to mint this series of Agathocles tetradrachms all appear to have been produced by the same engraver. The brow seems to frown and the hair style appears to have been reproduced in the same manner on each die (**fig. 99**). The reverse type of coins of Series Two is also produced in a different manner from those of Series One. The figure of Zeus is often larger within the space enclosed by the reverse legend and the additional word often seems to be almost squeezed onto the die (see **fig. 98**). These coins also only include a single monogram () on the reverse and are therefore issues of Mint B.

Figure 99: Obverse dies of Agathocles Series Two tetradrachms.

Series One and Two have very different characteristics: all the obverse dies in each series seem to have been produced by two different engravers, an additional word is included in the legend of the coins of Series Two, and the two series appear with different monograms. However, the study includes three coins that share some characteristics of both (**fig. 100**).

[378] Glenn (2011).

Transitional (Ρ)

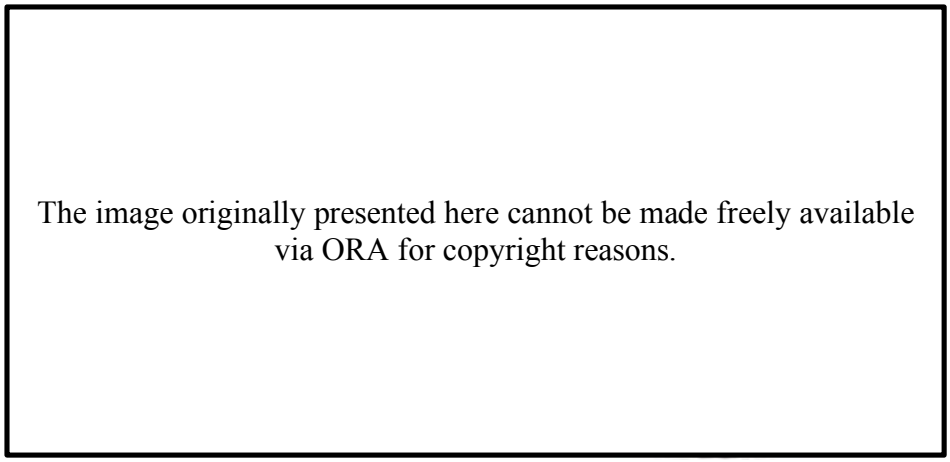


Figure 100: Tetradrachm of Agathocles transitional group (Hess-Divo 27th October 2010, 327).

These three coins were produced with an obverse die that seems to have been produced by the engraver of the Series One obverses. In **fig. 96** this obverse die appears in the top right hand corner of the collection of dies and shares many of the same features as the other dies: the pronounced ridge above the eye, the similar formation of the ends of the diadem, and the consistent representation of the hair, in particular the strands in front of the ear. The reverse, however, with its more rigid depiction of Zeus and the Ρ monogram seems to be closer to the coins of Series Two. The lack of the epithet on the reverse is very interesting. This small group of coins is therefore evidence for a transitional period between the characteristic features of Series One and those of Series Two. One obverse die produced by the original engraver of the earlier Series One dies was paired with a reverse die with a new monogram, engraved by a different artist, but without the additional word in the legend. Once this final obverse die had been worn out it was replaced by a new die engraved by a different artist, while the epithet was introduced on the reverse and the production of Series Two began.

The most plausible explanation for this group is that a single die was transferred to Mint B for the start of tetradrachm production at that mint. It seems unlikely that the engraver of the die was present at Mint B because only the one die with his style was used. The later obverse dies were clearly engraved by a different hand. We saw a similar phenomenon under Euthydemus with the transfer of production of the tetradrachms from Mint A to Mint B. In both cases it is not clear what caused this

shift in production, but as we shall see, tetradrachm production was not stopped at Mint A since some issues of Series Three were struck there.

Series Three: 'Pedigree' tetradrachms ()

The final series of Agathocles tetradrachms is the most famous: the so-called 'pedigree' coins. This series is made up of coins that are assumed to 'commemorate' a particular royal predecessor. The earlier king's portrait appears on the obverse with his name in the genitive as well as an epithet, but without the royal title. The reverse uses the same type as the original coins minted under the predecessor, but with the addition of an unchanging legend: ΒΑΣΙΛΕΥΟΝΤΟΣ ΔΙΚΑΙΟΥ ΑΓΑΘΟΚΛΕΟΥΣ. The use of a participle is an almost unique style of coin legend, only appearing in a similar manner on the 'pedigree' coins issued by Antimachus. The legend itself is a genitive absolute, to be translated as 'when Agathocles *Dikaios* was ruling', perhaps with the word 'minted' to be understood at the start of the clause. The production of such a series was unprecedented and these coins have caused historians of the Graeco-Bactrian kingdom much difficulty in interpretation.

Figure 101: Series Three 'pedigree' tetradrachm of Agathocles with types of Alexander the Great (Ashmolean, Hollis Collection).

The first 'pedigree' coin to be published was an Agathocles issue of the Diodotus Soter series.[379] Since Diodotus was already known from the text of Justin (41.4) as having been the king who declared the Graeco-Bactrian kingdom's independence from the Seleucid Empire, it was assumed that Agathocles was a contemporary of Diodotus and the use of the participle in the reverse legend taken to suggest that Agathocles was a subordinate of Diodotus. In the meantime more coins, with the types of different kings appeared as well as those of a similar series with the name of Antimachus on the reverse. Cunningham, for example, suggested that these coins indicated that all the kings who appeared on them (both on the obverse and on the reverse) were contemporaries, although with differing levels of power.[380] This explanation, however, fell flat when the first coin of Agathocles' Alexander series came to light. It was obviously no longer credible to assume that Agathocles had been a sub-king of some sort to all those who appeared on his coins, including Alexander the Great.[381] In addition to this the lack of a royal title given to the 'commemorated' king suggests that these figures were clearly dead at the time the coins were struck and the word *basileus* could only be applied to Agathocles or Antimachus.

Tarn made great use of these coins in his sweeping attempts at reconstructing Bactrian history. His interpretation suggested that they were evidence of a Seleucid propaganda war in Bactria, which began when Demetrius I invaded India. Antiochus IV Epiphanes is said to have sent his supposed cousin, Eucratides, to take back Bactria for the Seleucids.[382] Tarn therefore saw the 'pedigree' coins as attempts by each side in this 'civil war' to claim legitimacy for their cause by reference to their predecessors and ultimately to Alexander the Great. Eucratides is said to have begun this exchange with his production of a series of tetradrachms showing two individuals on one side of the coins, Heliocles and Laodice, while the other side shows Eucratides. The coin type is highly unusual since Laodice, but not Heliocles wears a diadem. This led Tarn to suggest that Laodice was of royal birth, and more specifically, a Seleucid princess. Eucratides then began the propaganda battle by highlighting his royal Seleucid descent. According to Tarn this led to Agathocles and Antimachus producing their own 'pedigree' coins in response.

[379] Lahiri (1965), 3-10.
[380] Cunningham (1884), 92-93.
[381] von Sallet (1881), 279-280.
[382] Tarn (1951), 196 ff.

However, not having such an immediate royal connection they had to resort to producing a series of coins that declared their lineage all the way back to Alexander, which Tarn took to be evidence of this claim to a descent from the Seleucids and a fictitious link to Alexander.[383]

As with many of Tarn's grander conclusions, it fell to A.K. Narain to temper them. Narain, quite properly, dismissed the supposed Seleucid connection of Eucratides and made a much more limited use of the coins.[384] He rejected Tarn's suggestion that the coins were struck to show Agathocles' and Antimachus' pedigree, instead proposing that they were actually issued to celebrate the inclusion of Gandhara in the kingdom, and that Agathocles merely chose to include 'prominent personalities' on them.

As so often in the field of Graeco-Bactrian history little development has come about since Narain, although an article published by Frank Holt in 1984 goes some way to taking a more scientific approach to the material. Holt gathered a corpus of the pedigree coins of both Agathocles and Antimachus that were known to him, and analysed it on the basis of style, metrology, and the control marks. It seems from some of his analysis that Holt also undertook a die study of the coins. Although no full die analysis is included in the article, Holt does mention some die links he identified. His ultimate conclusion on the purpose of these coins was to suggest that they were 'a political and religious proclamation of legitimacy, not a personal pedigree'.[385]

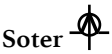
It is difficult to know exactly into what context these coins fit. The change of types and removal of the present king's image on the coins is a dramatic one, and completely different from the usual format of Hellenistic tetradrachms. The connection to the Heliocles and Laodice series can be rejected, since these coins were most likely produced after the death of Eucratides by Heliocles and Laodice themselves.[386] The 'pedigree' series is only made up of tetradrachms (there are no lower denomination examples), so the type was clearly aimed at the initial users of

[383] Tarn (1951), Appendix 3, 446-451.
[384] Narain (1957), 57.
[385] Holt (1984), 80.
[386] Glenn (2014). It is still unclear, however, who Heliocles and Laodice were and what role they played in the history of the Graeco-Bactrian kingdom.

the coins, those receiving regular state payments: soldiers. Whether these coins were a 'proclamation of legitimacy' or simply an attempt to honour previous kings, we cannot be sure. The appearance on the reverse of the epithet of Agathocles has often been overlooked in historical reconstructions. As we have seen, this feature indicates that these coins followed Agathocles' substantial earlier Series One tetradrachms. Any need to declare legitimacy would most likely have come at the start of a king's reign when his authority was probably at its weakest. Instead we find that, at that point, coins with standard types were quickly produced for Agathocles.

Table 32: Agathocles 'pedigree' tetradrachm die statistics.

Type	n	d_o	n/d_o
Alexander Pedigree	11	3	3.7
Antiochus Pedigree	17	3	5.7
Demetrius Pedigree	9	2	4.5
Diodotus Soter Pedigree	24	3	8
Diodotus Theos Pedigree	1	1	1
Euthydemus Pedigree	30	4	7.5
Pantaleon Pedigree	2	1	2

Type	n	d_r	n/d_r
Alexander 	7	3	2.3
Alexander 	4	1	4
Antiochus 	8	6	1.3
Antiochus 	5	2	2.5
Antiochus/Diodotus Theos	4	1	4
Demetrius 	3	1	3
Demetrius 	6	2	3
Diodotus Soter 	16	7	2.3
Diodotus Soter no monogram	1	1	1
Diodotus Soter/Antiochus 	8	4	2
Euthydemus illegible monogram	1	1	1
Euthydemus 	25	14	1.8
Euthydemus 	4	2	2
Pantaleon 	2	2	1

It is clear from the table that some series are represented better than others in the study. For example from 24 coins of the Diodotus Soter pedigree series included in the corpus, only three dies have been identified giving a very high n/d and increasingly the likelihood that the study contains a complete record of the original production. On the other hand only having one coin each of the Diodotus Theos and Pantaleon pedigree series (only one example of each of these series is extant) means that very few conclusions can be drawn. Such a small sample may suggest a very small original output, although it is impossible to tell.

The following table shows the obverse die estimates for each group of the pedigree coins, or where the n/d is too low the number of dies or simply the number of coins known. The table presents a very confusing picture, and it should be remembered that further coins may come to light in the future to fill in some of the gaps. As it stands, however, we see an uneven level of production. Mint A, from where the production of standard tetradrachms had been moved produced coins of all the major groups, only omitting the very rare issues showing Diodotus Theos and Pantaleon. Within the output of Mint A not all kings were represented equally, with Euthydemus having the largest production, involving at least three obverse dies, while the striking of Alexander pedigree tetradrachms seems to have been limited to a single die. Production at Mint B seems to have been smaller, although some of the groups are poorly represented. The omission of Diototus Soter and Euthydemus is particularly surprising since both kings appear on coins with the other two monograms. The final group is coins with the control mark . This monogram had not appeared on Graeco-Bactrian coins before and with no die links between coins of this series and those with different monograms it is not possible to assign this third group to a particular mint, although it is likely that production was taking place in a third, separate location. Again, not all of the kings appear on the coins struck at this mint, although the pattern of production does appear to be much closer to that of Mint A.

Table 33: Agathocles 'pedigree' tetradrachm die estimates.

Obverse king	Mint A (D_O)	Mint B (D_O)	Unattributed (D_O)
Alexander	1.2	d = 2	-
Diodotus Soter	2.3	-	2.8
Diodotus Theos	-	n = 1	-
Antiochus Nicator	1.1	1.5	1.2
Euthydemus	3.4	-	1.3
Demetrius	1.5	1.2	-
Pantaleon	-	n = 2	-

Not only are the kings who appear on the pedigree coins produced at Mint A and the mint the same, with a similar output, but the engraving style of the two mints is also very close. The illustration below (**fig. 102**) shows three coins, one from each monogram group, all with the types of Antiochus Nicator. It is likely that the same model was the basis of all three portraits, with the particularly severe brow line above the eye being visible on each coin. The style of the image is, however, not consistent across the three monograms, with the coin having a portrait that takes up less space on the surface of the die. The coins with and are so close in style it is likely that they were engraved by the same person. The only difference being the ends of the diadem ties. This close similarity in style to the coins of Mint A is visible on all pedigree coins. There are, however, no die links to coins with . It is possible, then, that the two groups were struck at the same location, but at different times. Without any firm links, however, the coins of have been left in a separate unattributed group.

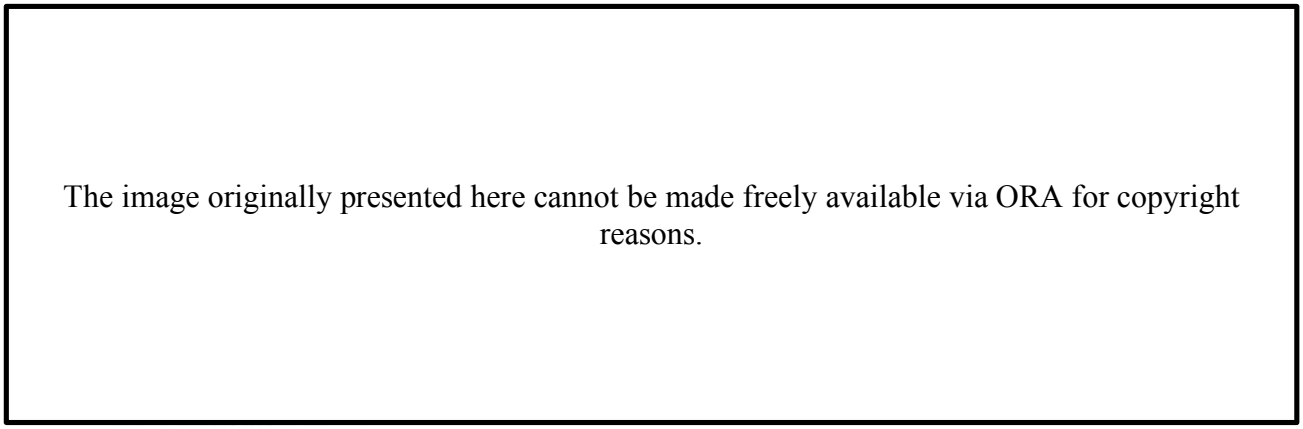


Figure 102: Obverses of Agathocles Series Three tetradrachms with types of Antiochus Nicator.

Left: Mint A ( ) CNG 11th Jan 2005, 634. Centre: Mint B ( ) CNG 9th Jan 2007, 451.
Right: Unattributed mint ( ) Fitzwilliam Museum CM 22-1971

A result of the close analysis of these coins was the identification of a very intriguing die link. **Fig. 103** above shows two pedigree coins, the first of the Antiochus Nicator series, and the second the unique Diodotus Theos coin. At first glance both coins were made with different dies, but on further inspection of the reverse die it becomes clear that it is actually the same die with the addition of a wreath below Zeus' outstretched arm and above the eagle. It is clear therefore that the Antiochus coin must have been minted before the Diodotus issue. As mentioned above, the pedigree coins made use of the reverse types of the king who was being commemorated, although different monograms were included on the reverse. The interpretation of the wreath on the original coins of the Diodotids is unclear. It has been suggested as another sort of control mark perhaps indicating a mint.[387] However, this explanation was refuted by Holt, who cited the copying of the wreath, but not the original monograms, onto the pedigree coins as evidence that the wreath was part of the type, not merely a control mark.[388] In Holt's organisation of the Diodotid silver coinage the wreath appears on both Diodotus I and II issues simultaneously at both the mints he identified. His interpretation of the wreath is that it is 'the patent numismatic sign of some great military victory', which may be linked with literary references to Diodotus I's defeat of Arsaces.[389]

[387] Kovalenko (1996), 23; 43.
[388] Holt (1999), 98.
[389] Holt (1999), 99.

The die links below perhaps suggest a similar confusion about the purpose of the wreath on the coins in the workshop producing dies for Agathocles' pedigree coins.

This die link does also provide a useful insight into the production of the 'pedigree' coins. It seems likely that these two coins were produced at a similar time. Long term storage of dies presented a risk to the security of the production system and raised the possibility that a genuine die that was not currently in use could have been taken and used to strike forgeries outside the mint. Presumably dies were destroyed at the end of their use, if they had not already been worn down so much as to be useless. If such a practice was prevalent then these two different pedigree issues, those of Antiochus Nicator and Diodotus Theos were presumably produced at a similar time with the reverse die recut to add the symbol familiar from the coinage of Diodotus. This indicates that the coins were part of a coherent production, and that they were not, for example, produced sporadically as 'commemorative issues'.

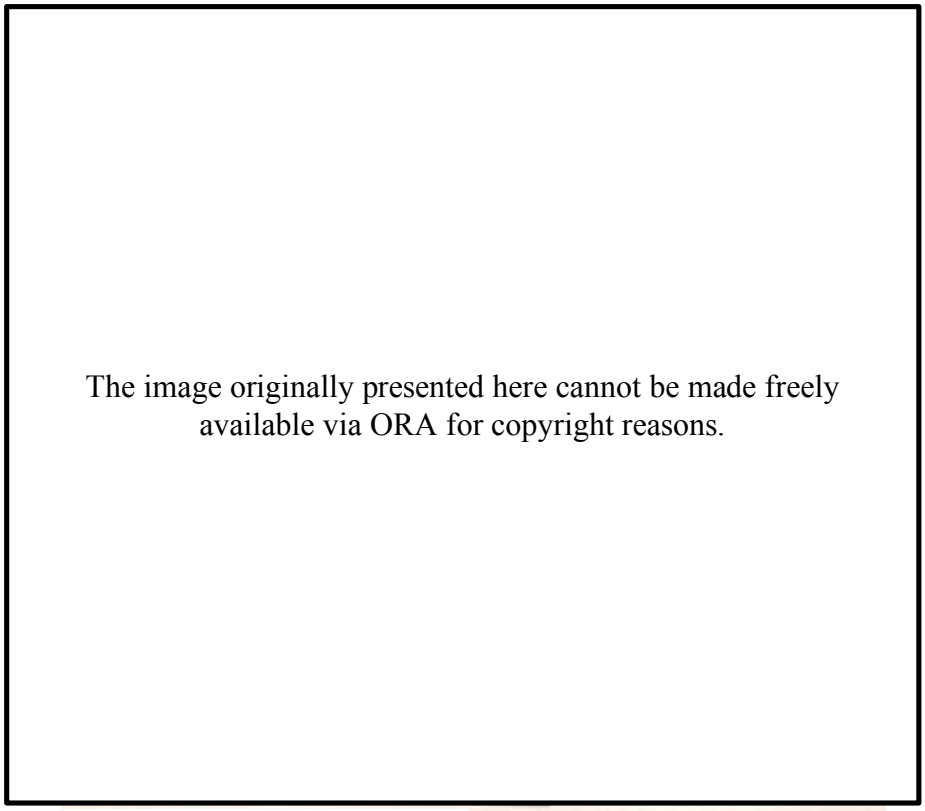


Figure 103: Top: Agathocles 'pedigree' tetradrachm of Antiochus Nicator series (CNG Triton X, 9th January 2007, 451). Bottom: Agathocles 'pedigree' tetradrachm of Diodotus Theos series (BNBact série 15, private collection).

As we saw earlier the identification of Antiochus Nicator on these coins has always been rather problematic. In his publication of the hypothesis of a separate Bactrian Antiochus, Jakobsson gave an arrangement of the Diodotid silver coins which he described as 'highly conjectural'.[390] It was based on the appearance of the wreath on these coins, which was said to have been added 'late in the reign of Diodotus I or early in the (sole) reign of Diodotus II, and removed relatively early in the reign of Antiochus Nicator'.[391] Whatever the meaning behind the wreath symbol, such an arrangement of the Diodotid coinage certainly fits much better with the evidence of Agathocles' pedigree coins. The inclusion of a previous Bactrian king on Agathocles' pedigree coins seems far more likely than a commemoration of the former Seleucid overlord.

Looking at the obverse die estimates as a whole for Agathocles tetradrachms, calculated with the total number of coins and dies for Series One and Two and then Series Three, rather than adding together estimates for each group, we find that the 'pedigree' coins were a significant proportion of Agathocles' output, making up just under half of the tetradrachm issues.

Table 34: Agathocles standard/'pedigree' tetradrachm production.

	d_O	D_O
Standard tetradrachm	18	20.9 (52%)
'Pedigree' tetradrachm	17	19.2 (48%)

Such a distribution is surprising. As we saw above, there has often been an indication in the scholarship that these coins were 'special issues' of some sort. The numbers above, however, suggest that they were actually an integral part of Agathocles' coinage. Of course, the proportion of the number of dies used does not necessarily translate to the total number of coins produced, since dies did not have to be used to destruction, however it is striking to see such a proportion of the total output being dedicated to the 'pedigree' coins. These coins were not a small part of Agathocles' coinage that was produced to commemorate special occasions; their production was just as large as the king's standard tetradrachms. The iconography

[390] Jakobsson (2010), 32.
[391] Jakobsson (2010), 32.

was intended for a wide audience and was therefore a significant move that would have had widespread impact.

Prototype pedigree (☩)

There is an additional group of coins that can shed some light on the adoption of the pedigree coin type. Three coins are known, one example of each with the types of Diodotus, Antiochus Nicator, and Euthydemus, with only a legend on the reverse identifying the king whose image is shown. One coin with the types of one of the kings called Diodotus is also known, with the legend ΔΙΟΔΟΤΟΥ ΣΩΤΗΡΟΣ. This coin has a long provenance, having appeared in a Schulman auction in 1905, and is now held at the British Museum.[392] The second coin, with a royal portrait and Zeus throwing a thunderbolt on the reverse and the legend ΑΝΤΙΟΧΟΥ ΝΙΚΑΤΟΡΟΣ was first published in 1994 and is said in a subsequent publication to have come from a fourth hoard at Aï Khanum.[393] The third coin appeared more recently, being published in 1999 and is now in the collection of the Alpha Bank.[394] The types of Euthydemus appear along with the reverse legend ΕΥΘΥΔΗΜΟΥ ΜΕΓΑΛΟΥ.

Figure 104: Prototype pedigree coin of Agathocles (BM). Photo - Mitchiner (1975), vol. 1, p. 41.

[392] Schulman December 1905, I, 1347.
[393] Bopearachchi (1994), 11-12; Bopearachchi and Rahman (1995), 216.
[394] Senior and Houghton (1999).

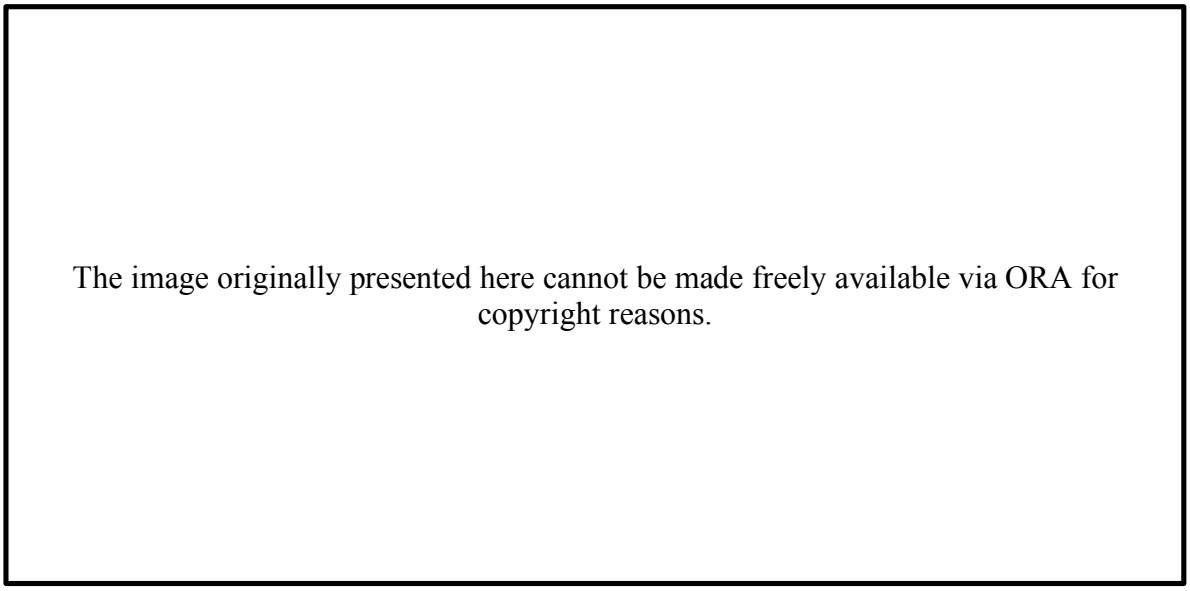


Figure 106: Prototype pedigree coin of Agathocles (Rahman Collection, 1057)

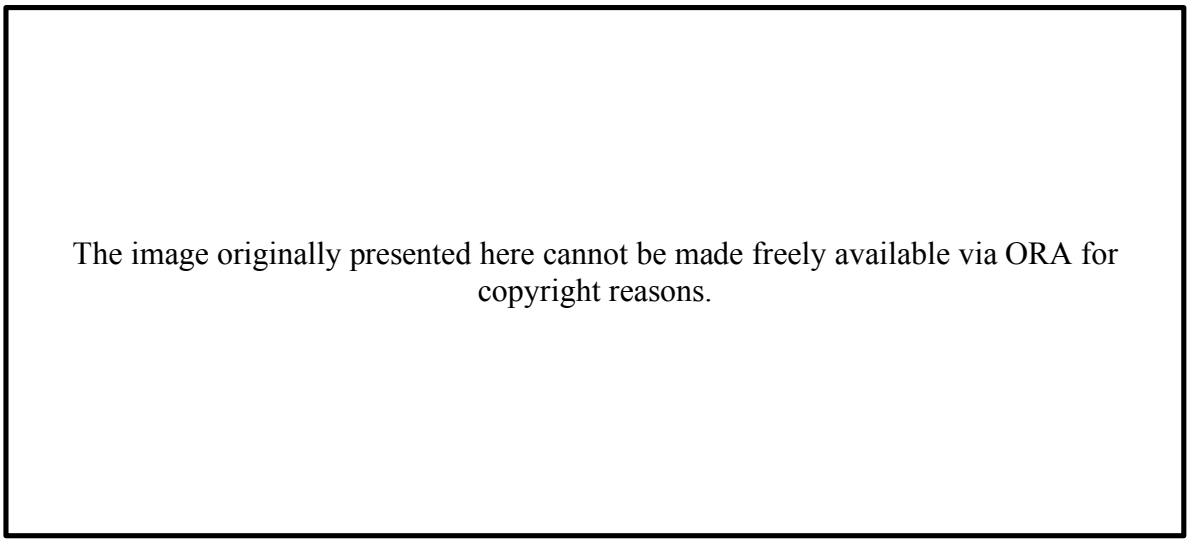


Figure 106: Series Three pedigree tetradrachm of Agathocles with Antimachus Nicator types (Coin 23 - CNG 11th Jan 2005, 634 etc.) N.B. different placement of monogram and inclusion of wreath.

The coin with the Diodotus types was a curiosity for many years, and was usually assumed to be an issue of one of the Diodotoi themselves.[395] Bopearachchi considered it to be a posthumous issue in his *catalogue raisonné*.[396] When the Antiochus Nicator type appeared it was also initially thought to be a Diodotid issue, commemorating someone assumed to be the Seleucid king.[397] It was only the appearance of the Euthydemus type that ruled out this possibility. The publishers of that coin considered it to be part of the same series as the earlier coins and they

[395] Mitchiner (1974), vol. 1, 41.
[396] Bopearachchi (1991), 153.
[397] Bopearachchi (1994), 11-12.

labelled it a 'pedigree' coin.[398] There is no legend equivalent to the reverse participle clause on the coins of Series Three to indicate an issuer. On this basis Agathocles and Antimachus were excluded as issuers of these coins, while the inclusion of the monogram on all three coins suggested to Senior and Houghton that the issuer was either Demetrius I or Euthydemus II.

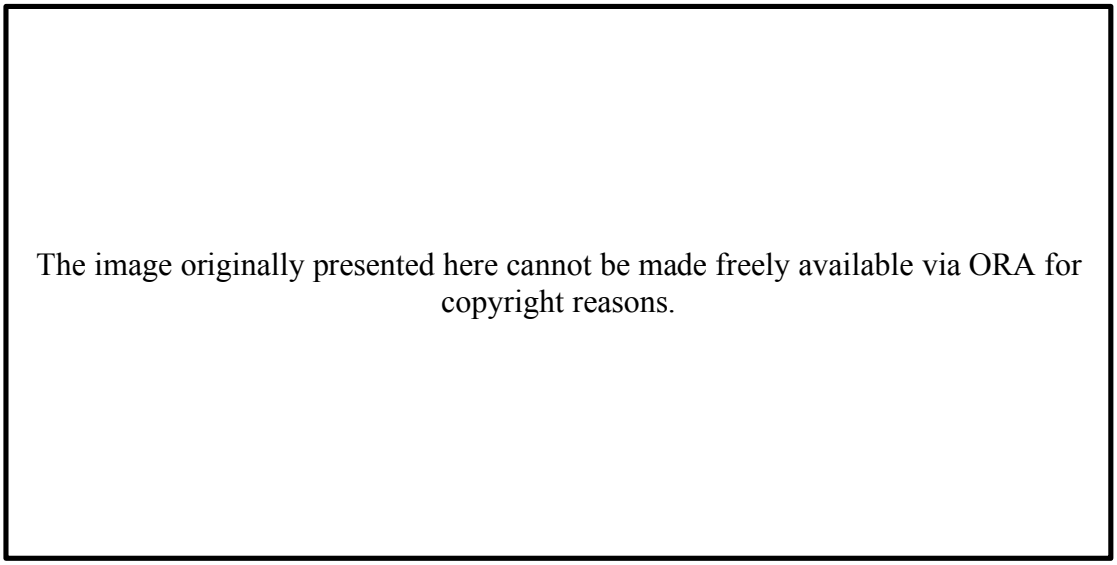


Figure 107: Prototype pedigree coin of Agathocles, 16.53g (Alpha Bank Numismatic Collection, 9828).

The omission of the royal title does indeed indicate that these three coins were not issued by the kings whose types appear on them. Stylistically, the portraits of these kings are extraordinarily close to those that appear on the Series Three coins issued under Agathocles, while the monogram is also shared with these coins. It is most likely that these coins were the initial issues of Agathocles' 'pedigree' series and were produced at Mint A. The decision to omit the name of the issuing king is an odd one, and was soon corrected on later issues. It is easy to imagine the prototype coins causing some confusion, particularly the coin of Euthydemus, whose own issues hoard evidence tells us were still circulating in Bactria. A coin with a portrait clearly different from that of the original issues, with a legend (for those users who could read it), which omitted the most important word in guaranteeing the acceptability of the metal was likely to have been refused. To deal with this confusion the later issues added a legend on the reverse (the usual position for the name of the issuer), while still identifying the king whose types appear on the

[398] Senior and Houghton (1999), 11.

obverse. In addition to this the epithet given to Euthydemus was changed to *theos*, although, other than the obvious indication of divinity, the reason for this is unlikely ever to be clear.

This prototype series is important, in determining the reasons for the introduction of the 'pedigree' tetradrachms. Initially it was clearly not thought necessary to include Agathocles' name on the coins and any argument suggesting that these issues were intended to detail his descent from the Seleucids and previous kings in order to bolster his legitimacy should be disregarded. Even when Agathocles' name appears on the coins it is shown with his own epithet, which had not appeared on his earliest coins. The 'pedigree' coins cannot therefore have been produced at the start of his reign, a detail which has been overlooked in many reconstructions of the period. Instead we are left with coins which do not include the image of the king under whom they were issued, a feature which may suggest quite the opposite about his authority, his name alone being enough to allow these coins to circulate.

It is, of course, impossible to know why these coins were produced, and any suggestion falls into the realm of fantasy. One final detail is worth noting. Of the kings whose types appear on these coins only Euthydemus II was omitted, all previous Graeco-Bactrian kings were featured, including Pantaleon. It is possible that Euthydemus II was a competitor of Agathocles at some point during his reign. The main monogram of Mint A () is, however, present on a significant proportion of Agathocles' and Euthydemus II's output, making it unlikely that they were producing coins simultaneously and it may simply be that any production of 'pedigree' coins with the types of Euthydemus II have not survived.

These coins were perhaps simply a recognition of the past under Agathocles, a commemoration of previous kings who had now been deified, a feature signalled by their newly-acquired epithets. The legend on the coins, which identified the king whose types appear was written in the genitive, indicating that in some way these coins were considered part of their issues. The reverse legend identifying Agathocles was merely a temporal clause, although it did also reveal the true issuer. As such the coins of Series Three may in fact fit into a religious structure of commemoration for which we have no further evidence. A comparison from

Roman Imperial coinage is notable here. A series of Antoniniani issued *c.* A.D. 250 under Trajan Decius feature obverse portraits of a number of earlier, deified emperors, with an inscription in the dative (e.g. DIVO AVGVSTO) identifying them and at the same time dedicating the coin to that emperor in conjunction with the reverse inscription, CONSECRATIO.[399] These coins seem to have been produced at the same time as the denarii of the earlier emperors were being withdrawn.[400] They fit into a wider phenomenon of the monumentality of coin types that is to be identified from the late Republic onwards.[401] There is no evidence to suggest that the 'pedigree' coins were struck to replace coins of earlier kings, and there is no change in denomination, but these comparisons may provide some insight into the reason for the introduction of such an unusual coinage.

Drachms

Table 35: Agathocles drachm die statistics.

Type	n	d_o	n/d_o
Series I Group I	20	10	2
Series I Group III	2	2	1
Series II	1	1	1
Totals	23	13	1.8

Monogram	n	d_r	n/d_r
	20	11	1.8
	2	2	1
 ΔIKAIOY	1	1	1
Totals	23	14	1.6

As opposed to 202 tetradrachms, the study only includes 23 drachms. This does not necessarily indicate that the original output of drachms was vastly smaller than that of the tetradrachms. In fact, there is relatively little die linking among the 23 coins, with 13 obverse dies identified giving an n/d of 1.8, once again much lower than the 5.1 for the tetradrachms, and not giving a suitable sample for the estimation of the original number of dies.

[399] Mattingly (1949). Note that the issuing emperor was not identified.
[400] Howgego (2005), 5.
[401] Meadows and Williams (2001).

Of the 23 drachms, 20 appear with the monogram  and with an obverse consistent with the characteristics of the engraver of the Series One dies, as well as the lack of an epithet. A single coin of Series Two has a reverse with the epithet and the monogram  as well as an obverse portrait consistent in style with the tetradrachms of the series. Although the evidence is very limited it does seem that the two series of standard tetradrachms were paralleled in the production of drachms. There are, however, two drachms with a different monogram () that had not appeared before on Graeco-Bactrian coins, and was not present on other denominations struck under Agathocles. This monogram is particularly puzzling and is a useful piece of evidence when considering the original purpose of these control marks, a subject to which we shall return in greater detail in the conclusion. It is enough here to note its isolated use on a single denomination.

Other Monolingual Issues

One of the notable omissions from Agathocles' system of coinage given above is the lack of an emission of obols. Although obols had not always been the largest denomination in the production of the mint (with the exception of Demetrius), they had at least been struck under Euthydemus I, Demetrius, Euthydemus II, and Pantaleon. As the smallest regularly produced denomination in the Graeco-Bactrian system they would have fulfilled an important role in allowing something approaching a fully-monetised economy to exist.

Interestingly the lack of smaller denominations in the output of the mint under Agathocles seems to have resulted in contemporary imitations being produced on a weight that would fit into the denomination of hemidrachm under the usual reduced Attic standard (**fig. 108**). The engraving of both types is far cruder than those on other issues, and the lettering of the legend indicates that it was not produced at an 'official' mint. The monogram on the coins appears to be a simple copying of another genuine monogram.[402] Such blatant imitations of other denominations of Agathocles' coins are not known. The appearance of contemporary imitations like this to fill a gap in the coinage as it was being produced at the time is very interesting, and although we know nothing about the

[402] Bopearachchi (1991), 180.

production of these imitations, the simple fact that they were made to address a lack of smaller denominations has important implications. The people who struck these coins may have been aware of a lack of lower value coins, and enterprisingly made their own to solve this problem, perhaps under the impression that they would be accepted with little argument since they were a convenient way of issuing smaller change. The identification of this gap suggests a level of monetisation in the Graeco-Bactrian kingdom. Other imitations of Bactrian coins are usually tetradrachms, with particularly copious examples of issues copying the types of Euthydemus I and Eucratides I. These contemporary imitations (previously termed barbarous) are identified in the case of the Euthydemus I as 'Sogdian' because of their findspots, and so were most likely produced outside the kingdom.[403] In many cases they also have their own monograms unique to the imitations. The imitations of Agathocles, however, are of a lower denomination, and simply copy an existing monogram. It is likely that they were produced within the kingdom to address an inconvenience in the lack of small change and are therefore quite different from the much larger issues of imitation tetradrachms.

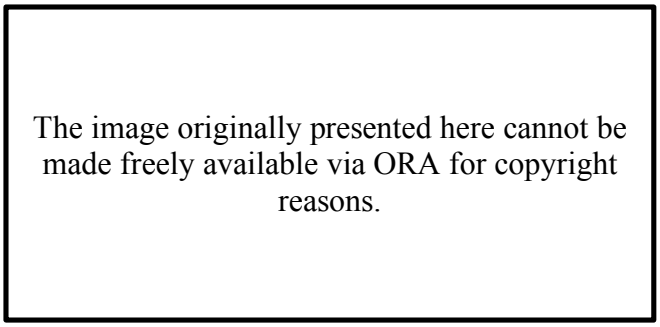


Figure 108: Imitation Agathocles hemidrachm, 1.58g (BM 1888.1206.116).

[403] Bopearachchi (1991), 163; 214.

Cupro-nickel doubles ()

Table 36: Agathocles cupro-nickel double die statistics.

CuNi doubles	n	d_o	n/d_o
Group I	26	23	1.1
Group II	1	1	1
Group III	20	16	1.3
Group IV	3	3	1
Totals	50	43	1.2

Monogram	n	d_r	n/d_r
	23	21	1.1
	1	1	1
	19	19	1
	3	3	1
Illegible	4	4	1
Totals	50	48	1

Agathocles continued to issue cupro-nickel coins with the same types that had been adopted under Pantaleon: an obverse bust of Dionysus with thyrsus, and a panther on the reverse. However, these coins were also produced on a single unit standard of *c.* 4.2g in addition to the double units of *c.* 8.4g that had been struck in the reign of Pantaleon. The types were the same on both denominations, and the production of bronze double units continued. The re-introduction of a lower value cupro-nickel denomination (this weight had been used under Euthydemus II) may have been intended to address the same problem as the imitation hemidrachms, although since it is unclear how the nickel coins would have fitted into the system of denominations, it is impossible to be certain.

Once more the state of preservation of the cupro-nickel coins was consistently poor making it very difficult to establish die identities with any confidence. The n/d value of both denominations is very low as a result, making any estimate of the original size of the coinage impossible. The monograms that appear on the coins are of interest, however, with the two major monograms of Mints A and B (and ) present. In addition there are also coins with and a single example of . The latter monogram was used under Pantaleon on his copper double unit coins,

while a variant of the former () is found on that king's cupro-nickel doubles. Once more the major monograms are supplemented by those with a more limited use.

Cupro-nickel units

Table 37: Agathocles cupro-nickel unit die statistics.

CuNi units	n	d_o	n/d_o
Group I	2	1	2
Group III	5	5	1
Illegible	6	6	1
Totals	13	12	1.1

Monogram	n	d_r	n/d_r
	2	2	1
	5	5	1
Illegible Monogram	6	6	1
Totals	13	13	1

The unit cupro-nickel coins are even more poorly represented in the study than the doubles. We find none of the minor monograms here, only the two major monograms of Mints A and B. The cupro-nickel coins were clearly produced at the same location as the silver issues although their poor state of preservation prevents any estimation of the original size of the coinage.

Bilingual issues

Under Agathocles the production of square non-Greek standard copper coins with the same goddess and lion types as those used under Pantaleon continued. The inconsistent weight and lack of monogram suggest that this was a simple continuation of the denomination with the same production process and location, one separate from the production of the monolingual issues. The n/d here (2.7) is high enough to allow an estimate of the original number of obverse dies (28.8). Much like the same denomination under Pantaleon we must assume that these coins were produced under a different system, perhaps south of the Hindu Kush.

Table 38: Agathocles AE large module die statistics.

AE Large module	n	d_o	n/d_o	D_O
Group I	48	18	2.7	28.8

Reverse	n	d_r	n/d_r
No monogram	48	38	1.3

Figure 109: Agathocles AE small module coin (Ashmolean).

Alongside the 'large module' coins another denomination is known. These coins continued the innovation in Agathocles' system of coinage. Greek iconography was completely replaced with Indian symbols: a hill topped with a star, and a tree in an enclosure. These types are common on Indian punch-marked coins, as well as on coins attributed to Taxila.[404] The legend, written only in Kharosthi, reads *Akathukreyasa*, 'Agathocles' on the obverse, and *Hiranasame*, 'the Golden Hermitage' on the reverse. The lack of a royal title in the obverse legend is very unusual, and the possible implications of the types have been discussed above.

[404] Tarn (1951), 160.

Table 39: Agathocles AE small module die statistics.

Small module	n	d_o	n/d_o	D_O
Group I	8	3	2.7	4.8

Reverse	n	d_r	n/d_r
No monogram	8	2	4

The shape of the flans of this series of coins is particularly unusual. The 'large module' square bronzes with bilingual legends struck under both Pantaleon and Agathocles consistently have four straight sides. These 'small module' issues often, although not always, have a curved edge (**fig. 109**). The surfaces of the coins are also rarely smooth, and may be that undertypes are visible on some examples. The shape of these coins, with a single curved side is very different from any coins that had come before in the Graeco-Bactrian series. It is perhaps a coincidence, but when handling four examples it become clear that it would be possible to fit them all together with the resulting shape being approximately the size of the large sextuple bronze coins issued under Demetrius. I have been unable to identify any undertypes as being from these large coins, but it is possible that the flans for this group of Agathocles' coins were produced by cutting and overstriking the uniquely large bronze issues of one of his predecessors. The weights of these coins are noticeable more consistent (standard deviation of 0.58) than the 'large module' series (standard deviation 1.71), probably indicating a different production method and certainly not eliminating the possibility that the blanks were produced by cutting up the earlier coins. Although only eight coins are included in the study, they were struck from only three dies, giving an estimate of the original number of dies as 4.8, making this a much smaller coinage than the 'large module' denomination.

Square silver

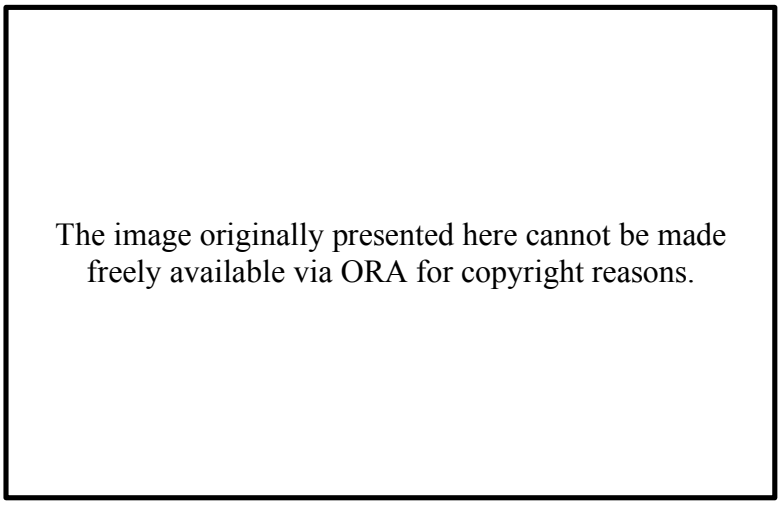


Figure 110: Bilingual square silver coin of Agathocles (Mitchiner 149).

The final series of Agathocles coins is the well-known issue of square silver 'drachms'. These coins are known purely from a hoard found in room 20 of the so-called 'administrative quarter' at Aï Khanum in 1970 during the excavations undertaken by the DAFA. The excavators found a large water vessel containing 677 Indian silver punch-marked *karshapanas* and six square silver coins of Agathocles (figure 13). The final burial date of the hoard occurred in the second century BC.[405]

Table 40: Agathocles AR square die statistics.

AR square	n	d_o	n/d_o	D_O
Group I	6	2	3	3

Monogram	n	d_r	n/d_r
No monogram	6	3	2

These coins have the usual Greek legend of Agathocles on the obverse: ΒΑΣΙΛΕΩΣ ΑΓΑΘΟΚΛΕΟΥΣ, with a translation in Brahmi on the reverse: *Rajane Agathuklayasa*. The iconography employed on the coins is completely different from any images that had previously appeared on Graeco-Bactrian issues and has been discussed in detail above. Audouin and Bernard identified two obverse and three reverse dies when they published these coins.[406] With only six coins detailed analysis is clearly impossible, although the small number of dies may suggest a

[405] Audouin and Bernard (1974), 41.
[406] Audouin and Bernard (1974), 8.

relatively small issue, with only the three dies known being the only ones used to strike the coins. It has recently been suggested that the weights of these unusual coins were intended to allow them to circulate south of the Hindu Kush alongside the *karshapana*.[407] Whatever the case these coins are another example of Agathocles' numismatic innovation and were clearly intended for circulation outside of Bactria.

Summary

The numismatic picture of the reign of Agathocles is quite different from that of earlier Graeco-Bactrian kings. Under Agathocles a number of innovations in the coinage appeared. For the first time different bilingual denominations were struck, one of which was precious metal. Whether these non-Greek standard coins suggest an extension of the kingdom to Northern India, or simply an effort to produce a coinage that would be acceptable to a different group of users and therefore facilitate trade, is uncertain. The purpose of the 'pedigree' coins is also unclear, although we can now be certain that these coins were an important part of the mint's output under Agathocles and that they were not 'commemorative issues' produced for special occasions. During the reign of Agathocles the initial developments that had appeared under Pantaleon were extended. There was some continuity in the production of coins at Mint A, while Mint B, which had not been used to strike coins for Pantaleon was reopened sometime during the reign of Agathocles, an event that coincided with the addition of the epithet to the legend of the coins. After this period, a third series of coins appeared with the types of earlier kings, for whatever reason. Initially these coins were struck without any reference to Agathocles only at Mint A, but it was not long before production was extended to Mint B and possible a third mint. At the same time Agathocles' name was included on the coins in an unusual participle phrase which indicated that the coins were issued under Agathocles' authority. These coins were the final issues of Agathocles and, as we shall see, continued to be issued under his successor, Antimachus.

[407] Baralay (2015).

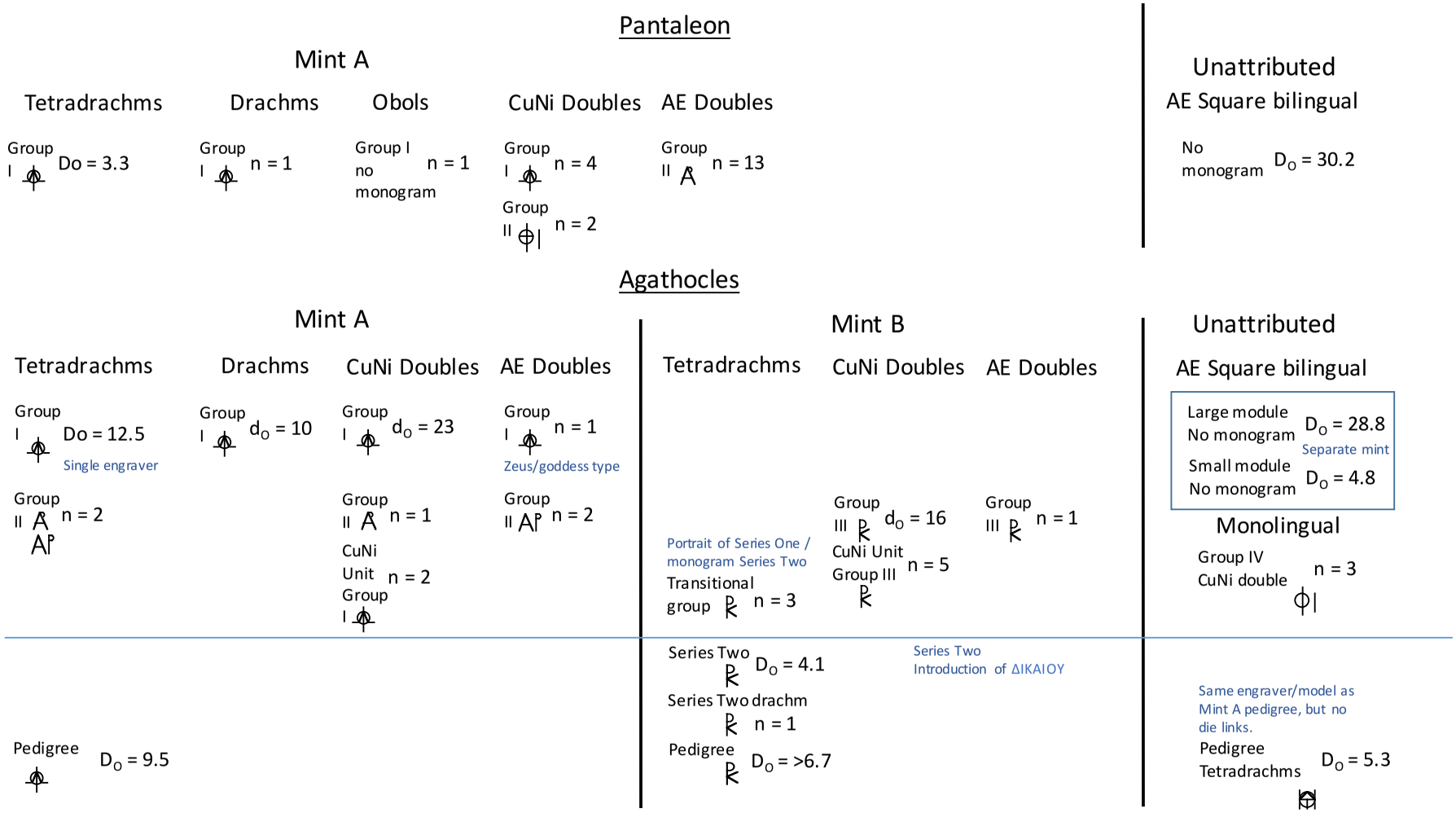


Figure 111: System of production under Pantaleon and Agathocles.

Chapter VIII: Antimachus I

We come now to the final king to feature in this study, Antimachus I. The portrait that appears on the silver tetradrachms minted under Antimachus I has become one of the most famous portraits to appear on any Hellenistic coin.[408] The king is shown on the obverse wearing a *kausia* and often a slight smile. On the reverse his coins are set apart from those of his predecessors by the inclusion, from the beginning of production, of the epithet *theos* to the legend, as well as by the appearance of the god Poseidon, a deity who had not previously appeared on Graeco-Bactrian coinage.

Figure 112 - Tetradrachm of Antimachus I, 16.33g (Ashmolean, Shortt Bequest).

Chronological Indicators

There is one clear feature of Antimachus' coins that points towards a sound numismatic sequence. All of the silver coins (tetradrachms, drachms, hemidrachms, and obols) minted during Antimachus' reign included the epithet in the legend. As we have seen, coins of the Diodotoi, Euthydemus I, Demetrius, Euthydemus II, and Pantaleon made no use of epithets at all, while the addition of a word to the king's name in the legend began under Agathocles, with the second series of that king's tetradrachms. Based on the appearance of titles on the coins, as well as the progression of the pedigree coins (with prototypes produced under Agathocles), Antimachus must be placed after Agathocles in the order of Graeco-Bactrian

[408] Sutherland (1955), 57 suggested that the image, along with other Hellenistic coin portraits, 'can take [its] place among the world's chief artistic works'.

kings.[409] The minting of rectangular coins on a non-Greek weight standard also indicates that Antimachus was a later king.

System of Coinage

Table 41: System of coinage under Antimachus I.

Denomination	Number of examples (n)	Weight range (g)	Mean weight (g)	Standard deviation	n/d (obverse dies)	Estimated number of obv. dies	Monograms
Circular							
AR Tetradrachm	392	14.82-17.14	16.55	0.42	5.6	88	
AR Drachm	61	3.50-4.30	4.02	0.22	4.7	16.5	
AR Hemidrachm	4	1.95-2.08	2.03	0.06	2	n/a	
AR Obol	57	0.31-0.72	0.64	0.07	2.1	51.3	
AE Double	22	6.54-8.48	7.66	0.53	1.6	38.5*	
Rectangular							
AE Denomination 'A' 'Large module'[410]	8	9.13-12.7	11.02	1.19	1.3	n/a	-
AE Denomination 'B'	7	2.01-2.82	2.53	0.34	1.8	n/a	-

A reasonably full set of silver denominations was produced under Antimachus, with the omission of the hemiobol. The tetradrachms are once again to be divided into standard issues (those mentioned above with the king's portrait and the Poseidon reverse) and 'pedigree' coins. The 'pedigree' series of Antimachus is, however, very different in nature from that of Agathocles. Under Antimachus only two kings (Diodotus Soter and Euthydemus Theos) appear on the obverse of the coins rather than the seven kings who are shown on Agathocles' issues. Similarly the pedigree series of Antimachus only makes use of one monogram (), which does not appear on the king's standard tetradrachms, while under Agathocles three different

[409] Cribb (2005), 209-210.
[410] Bopearachchi (1991), 186 identified two separate series (6 and 7) based on a difference in weight and a variation in the orientation of the obverse type.

monograms ( ,  , and) were put on the reverses of the pedigree coins, with two also being used for the regular tetradrachms.

Table 42: Agathocles and Antimachus tetradrachm die estimates.

	Agathocles	Antimachus
Standard tetradrachm D_O	20.87 (52 %)	81 (95 %)
Pedigree tetradrachm D_O	19.22 (48 %)	4.8 (5 %)

The above table shows the results of calculating estimates for the original number of obverse dies used to produce the standard and pedigree tetradrachms of Agathocles and Antimachus using Esty's 2011 formula. Under Agathocles the pedigree tetradrachms made up approximately half of the total output of that denomination. During Antimachus' reign the production was very different, however, with only five per cent of the dies being used to strike the pedigree coins. A difference in the number of dies used was probably to be expected, given that Agathocles' pedigree coins commemorated many more kings than Antimachus', but such a sizeable change in the focus of production is striking. The position of this issue as such a small proportion of the mint's total output during the reign of Antimachus is particularly interesting and the coins themselves demand further attention.

Pedigree tetradrachms ()

Not only was the output of pedigree coins under Antimachus much smaller than it had been under Agathocles, it was also less even. With an n/d of six for both Diodotus and Euthydemus issues, the die estimates can be given with some confidence, showing that it is quite possible that only one die was used to produce the Diodotus coins, while at least three were needed to strike the Euthydemus equivalents.

Table 43: Antimachus I 'pedigree' tetradrachms die statistics.

Pedigree type	n	d_o	n/d_o	D_O
Diodotus Soter	6	1	6	1.2
Euthydemus Theos	18	3	6	3.6
Total	24	4	6	4.8

Type	n	d_r	n/d_r
Diodotus 𐌍	6	2	3
Euthydemus 𐌍	18	10	1.8
Total	24	12	2

Although only pedigree tetradrachms of Diodotus Soter and Euthydemus were minted for Antimachus they share a number of features with Agathocles' pedigree coins. A comparison between a pedigree coin of Agathocles and a die group consisting of a single obverse die and two reverses on the coins of Antimachus is shown below (**fig. 113**). The similarities between the execution of the obverse portrait of Diodotus Soter are striking. The depiction of the face is very close, and the curls of hair on the back of the head are executed in an identical manner on both coins. Such a close representation is probably not the result of extraordinarily close copying on the part of two die engravers, but actually the work of the same hand.

The legends of these two coins also appear to have been engraved by the same person, although not necessarily the same person who engraved both portraits. In particular the second delta of 'Diodotus' is out of line with the bottom of the omicron that precedes it on both coins. This is a rather unusual feature; very rarely do the letters of the legends on the coins of any of the kings in the study not align correctly. Likewise, on the other side of the legend the omega and tau of 'soter' look very similar. The omega looks relatively flat when compared with the other letters of the legend and is spaced poorly between the sigma and tau. The crossbars of the tau in the legend on both coins is slightly curved, another unusual feature, and a particularly difficult one to replicate since the engraving of a straight line into the bronze of the die would be easier than such a curve. Perhaps the technique used by this particular engraver produced such a curve each time it was engraved. This feature certainly seems to be a useful indicator of this engraver's work.

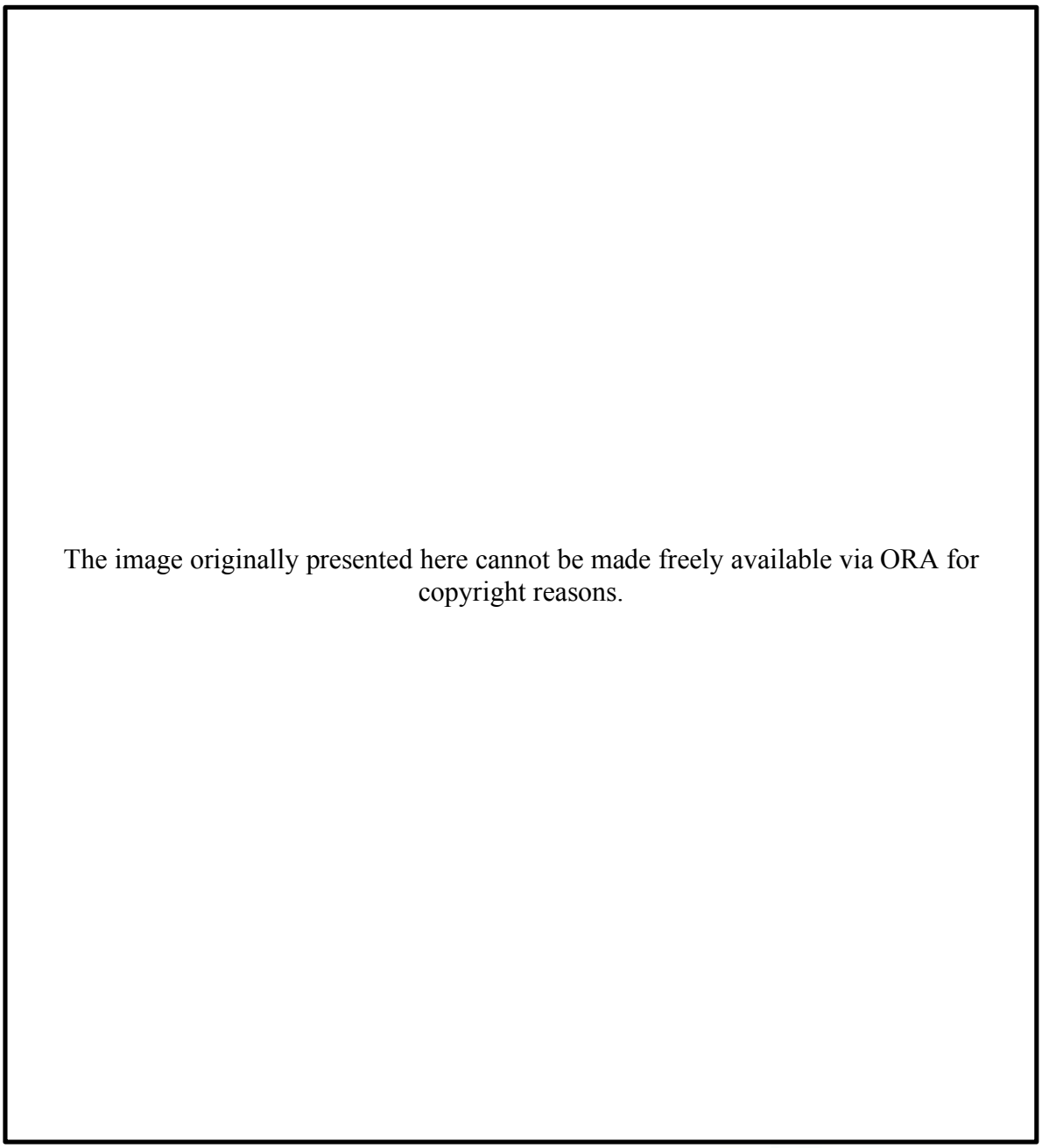


*Figure 113 - Top: Agathocles tetradrachm commemorating Diodotus Soter (Gorny & Mosch, 14th October 2002, 340) Bottom: die group of Antimachus pedigree tetradrachms (*SNG *ANS 296 & Spink, Auction 3014 8th October 2003, 143).*

There is an even clearer link between the pedigree coins commemorating Diodotus Soter minted under Agathocles and those minted under Antimachus. **Fig. 114** shows two of the obverses of these issues. Both coins were struck with the same die. The shape of the diadem ties is very similar on both coins, as is the line of the curve at the bottom of the king's neck, and the single line at the throat. The intricacies of the curls of the king's hair are exactly the same, particularly at the temple (marked as A) and in the region at the back of the head below the diadem (B). Finally, the position of the king's head in relation to the legend is identical. Taking the second delta of the king's name, the nose of comes very close to a corner on both coins.

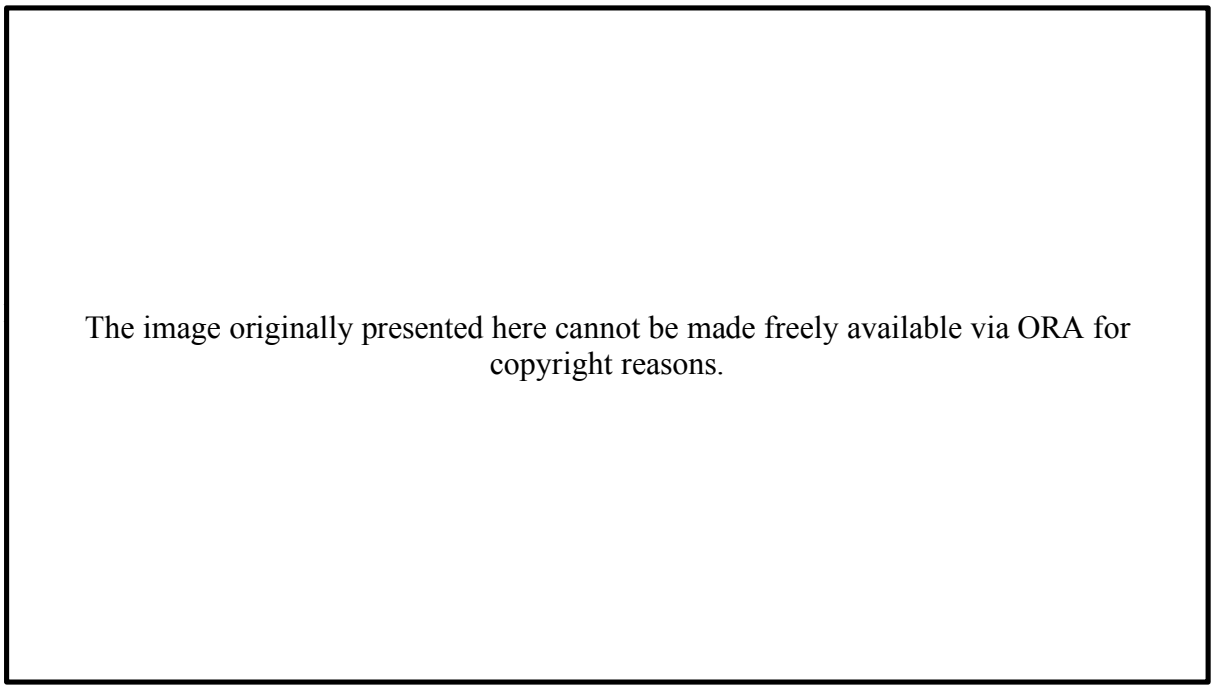


*Figure 114 - Left: Agathocles tetradrachm commemorating Diodotus Soter (Alpha Bank Numismatic Collection 4118). Right: Antimachus tetradrachm commemorating Diodotus Soter. Note die break behind king's head (*SNG *ANS 296).*

Unlike other die links highlighted above there is one clear difference between the engraving of the two dies: the omicrons in 'ΔΙΟΔΟΤΟΥ' are noticeably larger on the Antimachus coin (marked as 1 in **fig. 114**). This difference is obviously significant, and indeed has been pointed out in passing before and used to suggest that these coins are not in fact die linked.[411] Such a patent difference between the two coins casts doubt on the identification of a link. **Fig. 115** shows in the top right the best preserved Agathocles pedigree coin of this die, while the other three images are the same Antimachus coin reproduced. Lines have been superimposed and aligned

[411] Holt (1984), 74.

both horizontally and vertically between the two coins. This allows particular features of the coins to be compared. The lines are all aligned with the relevant features of the two coins, indicating that the coins were struck with the same die.[412]

The final coin in **fig. 115**, in the bottom right of the illustration, is the Antimachus pedigree coin with differences from the Agathocles coin highlighted in higher contrast. There are changes in the size of the omicrons in the legend, as well as the end of the king's neck and some areas of the hair. Finally, there is a large bulge that has appeared between the sigma of the legend and the back of the king's head. This bulge is visible only on the pedigree coins with an Antimachus reverse, and not on those with the Agathocles legend and is a flaw in the die. Since it is only present on the coins of Antimachus it provides a very useful chronological marker, indicating that the pedigree coins of Agathocles must have been minted before those of Antimachus. **Fig. 116** shows enlargements of the area of the die break on the six Antimachus coins in the study with the Diodotus Soter type. The development of the break is clear to see: the lines of the flaw are quite thin in the images in the first column, although gradually getting thicker until the appearance of a major break under the original imperfection on the final two coins in the second column. The appearance of this die break is a very helpful indicator for us and the importance of which cannot be understated because of the chronology it provides.

The die break also explains the minor differences between the two dies. When these coins are viewed from the side it is very clear that the omicrons of the legend were engraved on the die in very low relief. They would therefore be the first part of the legend to degrade after the dies had been used to strike coins for a prolonged period of time. So, although the employees of the mint ignored the die break behind the king's head, they did fix the problem of the presumably illegible omicrons before the die was put back into use striking coins for Antimachus. In a similar manner, the changed area on the crown and behind the king's ear are some of the highest relief on the coin, and therefore part of the deepest section of the die. It would therefore be possible to recut these sections without affecting the other features of the die. The die break at the back of the head, however, lay between the two areas on the die. In order to fix the flaw it would not have been possible to keep much of the

[412] The same technique was used by Stannard and Fischer-Bossert (2011), 12-17 with reference to the Athenian decadrachms.

portrait, since the die would have had to have been cut shorter in order to remove the break. As we shall see later, this fortuitous break allows us to reconstruct the way these dies were used in the production of Antimachus' coinage.

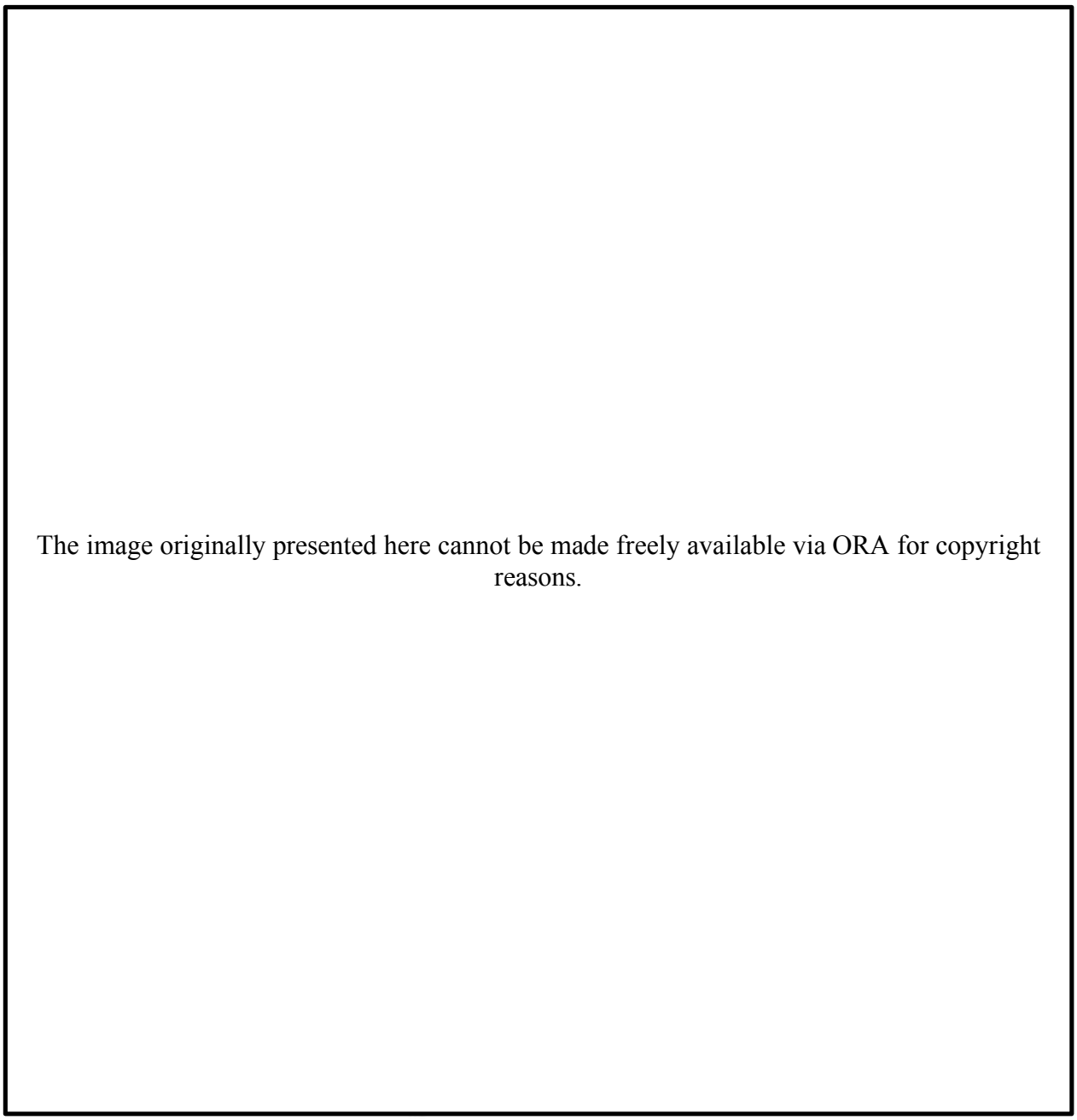


Figure 115: Top left: Agathocles Diodotus Soter tetradrachm (Alpha Bank Numismatic Collection 4118).

*Top right & bottom left: Antimachus Diodotus Soter tetradrachm (*SNG *ANS 296) with lines superimposed to aid comparison between coins.*

*Bottom right:*SNG *ANS 296 with recut areas indicated in higher contrast.*

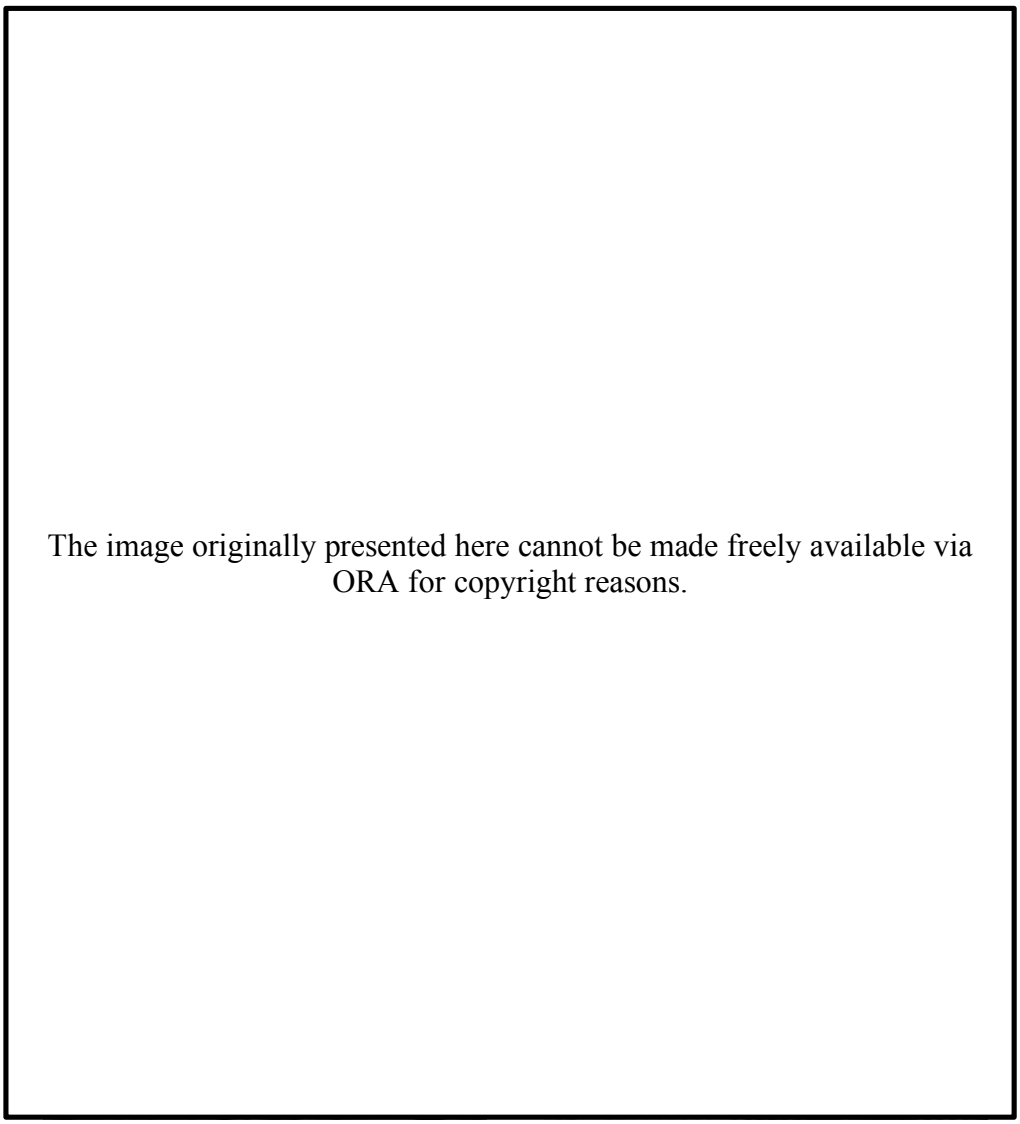


Figure 116: Enlargements of the die break area on the six examples of the single Diodotus Soter pedigree die of Antimachus.

A phenomenon similar to the copying of the Diodotus dies mentioned above is also to be seen when the Euthydemus pedigree coins of Agathocles and Antimachus are compared (**fig. 117**). The coin at the top of the figure is an example of one of Euthydemus' original tetradrachm issues. Below it are two coins of the pedigree series commemorating Euthydemus, minted under Agathocles and Antimachus respectively. It is difficult to find an exact prototype for the pedigree series coins, but it is clear that the portrait that these coins emulate is one of the 'aged' series of Euthydemus. The copying is not close and it seems unlikely that the engravers of the pedigree dies would have had access to an example of the coin they were copying. Detailed hoard evidence is lacking, although the Qunduz hoard contained both Euthydemus and Antimachus tetradrachms, indicating that coins of

Euthydemus would probably have been available to the mint. It is possible that, as was likely the case with the Alexander dies of Agathocles, the image of Euthydemus was familiar to engravers (hoard evidence suggests his coins remained in circulation throughout the period of the Graeco-Bactrian kingdom) and that the dies were produced with reference to nothing more than this common visual memory.

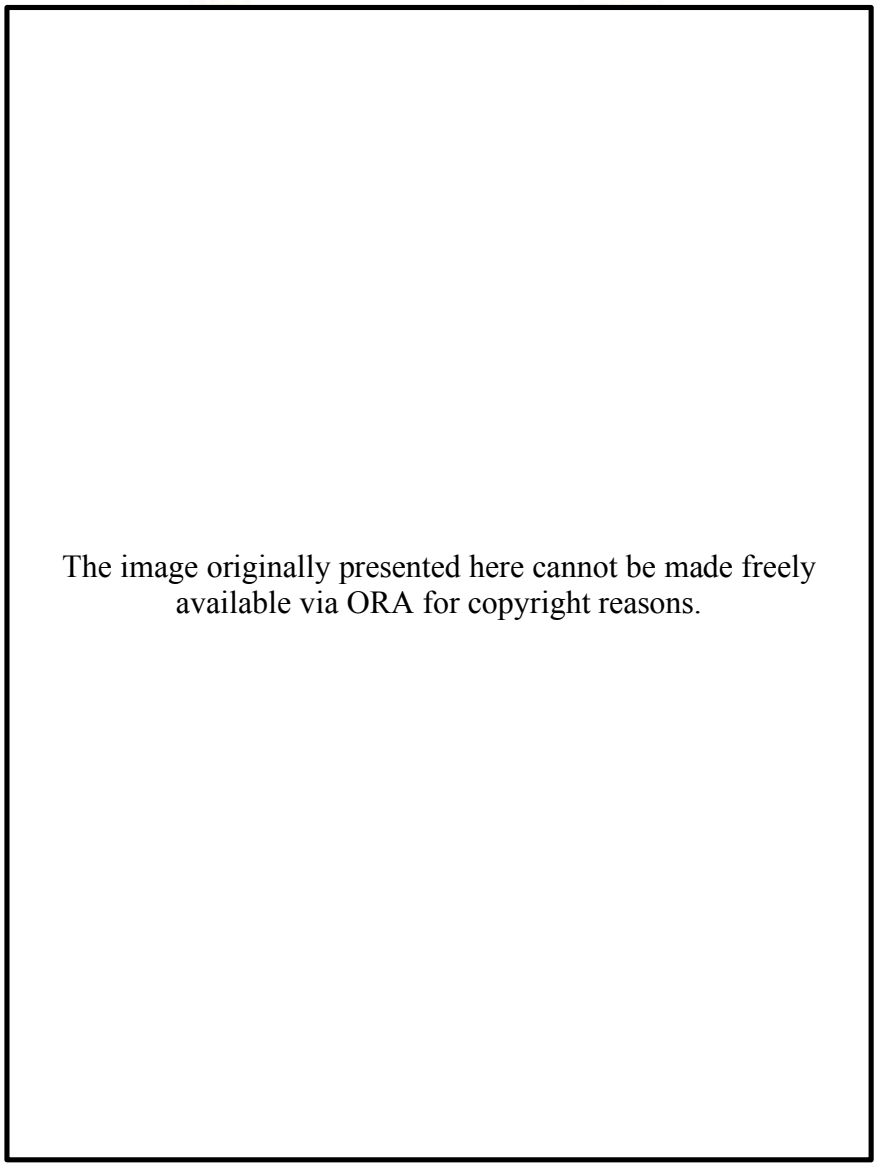


Figure 117: Top: Tetradrachm of Euthydemus I (Ashmolean). Middle: Euthydemus Theos pedigree tetradrachm of Agathocles (Ashmolean). Bottom: Euthydemus Theos pedigree tetradrachm of Antimachus (Giessener Münzhandlung Dieter Gorny Auction 95, 9th March 1999, 429).

Unlike the coins commemorating Diodotus above, it would appear that the two dies that made the pedigree coins in **fig. 117** were engraved by different people. There does, however, seem to be a progression in the features of the coins from the coin of Agathocles to that of Antimachus. The facial features of Euthydemus in the bottom

coin have been exaggerated in the copying process: the nose is pointed, and the curls of his hair have been copied from the Agathocles coin, but simplified in the process. Likewise, on the reverse the figure of Heracles, particularly at the head, is engraved less accurately. The club, which on the coin of Agathocles rested on an extension of the rock, seems on the Antimachus issue almost to hang in mid air, a composition also seen on some Euthydemus tetradrachms. The structure of the rock itself is also copied more or less exactly from the middle coin. Here the rock is made up of rows of dots intended to give the impression of contours in the rock. On both coins there are three rows: the bottom made up of four dots, and the upper two consisting of three each. It seems highly likely that the Antimachus pedigree coin was closely copied from the Agathocles coin rather than reverting to the original prototype of the tetradrachms of Euthydemus I.

It is clear from this study that the pedigree coinages issued under Agathocles and Antimachus were each of a very different nature. Agathocles' pedigree coins were an integral part of his coinage and an innovation introduced in his reign, while the issues of Antimachus make up a very small percentage of his output. It is possible that little time passed between the striking of the two series. Die breaks are not entirely unknown in the Graeco-Bactrian series (a particularly obvious one was identified on a die of Agathocles above), but they are rare. It does not seem to have been a common occurrence that the striking of coins continued when a flaw had developed on the die. The fact that this die remained in use to strike the pedigree coins of Antimachus may suggest a rushed production, in that there was no time (or resources) to commission another Diodotus die. Likewise the reuse of the die may have been due to a small intended output of pedigree coins; it would be wasteful to produce a new die if only a few coins were required. In fact, only one such die was used to produce the remaining Diodotus Soter pedigree coins of Antimachus, a situation that was rather different from the production of the Euthydemus type.

On the basis of this information I shall venture a tentative reconstruction of the production of these two coinages. At some point during Agathocles' reign, perhaps relatively early on, it was decided (for whatever reason) to produce a series of coins that commemorated previous Graeco-Bactrian kings as well as Alexander the Great. Although they differed from the 'standard' tetradrachms produced by the mint they

still used the reduced Attic weight standard and so should still be seen primarily as functional money rather than 'commemorative medals'. This point is reinforced by the large number and high proportion (just under half) of the total silver available for striking tetradrachms that was allocated to these pedigree issues. Upon Antimachus' rise to power the mints received very little detail about the new king right away and were unsure what specific portrait features and choice of reverse type would be placed on his coinage. In order to continue striking the available silver the mint authority took advantage of the pedigree type. These coins would only require a new name on their reverse: the same types could continue in use. Initially a single Diodotus Soter die originally used under Agathocles was put to work, alongside a new reverse die with a different legend and monogram. The die break visible on these coins makes the chronology certain, and may also indicate a rushed production or inability to replace the damaged die, although the mint was able to perform some minor repairs before the die was reused. Some of the engravers employed to produce the new dies for these coins were the same workers who had until recently been cutting pedigree dies for Agathocles. This run of Antimachus pedigree coins was quickly curtailed, perhaps when new types were provided by the royal administration and the large production of Antimachus' now famous tetradrachms with *kausia* and Poseidon began.

Standard Tetradrachms

Unlike the tetradrachms struck under Agathocles, those produced for Antimachus cannot be separated into series and placed in a chronological order since the legend and types remain consistent after the end of the pedigree issues. I have therefore organised the coinage into four groups based primarily on the monogram that appears on the reverse, with some consideration given also to the varying features of the engraving of the obverse portrait of the king. The n/d value for all of Antimachus' standard tetradrachms is 5.7, indicating a good sample, although this number is artificially inflated by the very high n/d value for the Group II coins: 12.7, one of the highest in this study. In the other groups the number is lower, although never poor enough to preclude die estimates. The overall size of the tetradrachm

coinage has already been discussed, with Esty's 2011 formula providing an estimate of 88 obverse dies, a number twice as large as that for Agathocles (41).[413]

Table 44: Antimachus I standard tetradrachm die statistics.

Type	n	d_o	n/d_o	Do
Group I	23	6	3.8	8.1
Group II	152	12	12.7	13
Group III	143	34	4.2	44.6
Group IV	36	10	3.6	13.8
Totals	354	62	5.7	75.2

Type	n	d_r	n/d_r
	23	20	1.2
	150	39	3.8
	139	80	1.7
	2	2	1
	1	1	1
	33	20	1.7
E	3	2	1.5
Illegible	3	3	1
Totals	354	167	2.1

Group I ()

The coins of Group I share a number of similarities with those of Group II, but are labeled separately because of the consistent use of a different monogram (). This monogram was not found on Antimachus' pedigree coins, but was present on the last issues of Agathocles standard coinage, probably indicating a production at Mint B. This group has been placed first since it shares its monogram with the tetradrachms of Agathocles' second series. With very little else to go on, the continuation of the monogram may indicate that these two issues were not chronologically far apart and therefore that, however tentatively, this group should be seen as the first of Antimachus' standard tetradrachm issues. The style of the obverses of Group I is very consistent: five of the dies seem to have been engraved by the same hand (all those except the die in the bottom left of **fig. 118**). The king's

[413] This number for Antimachus may be a slight overestimate since it was calculated twice in order to remove the bias of the very well represented sample of the Group II tetradrachms, which have a misleadingly high n/d value. Since the formula makes certain assumptions about missing dies, calculating it twice can lead to an artificially increased estimate.

hair is engraved in the same way each time with a dotted line extending from the temple under the brim of the *kausia*, while there are deep furrows visible on the forehead. Likewise the way in which the two trailing ends of the diadem are engraved is very similar across the five dies. The knot is not visible, with the two tails shown distinctly separate all the way from their emergence from under the *kausia*, while their curved trail is among the most expansive of the different depictions of the diadem on the coins of Antimachus. On these five dies the ties are shown in a similar fashion each time with the two mirroring each other as they first sweep down the back of the king's head only to rise up in tandem behind his neck giving the illusion of motion. Such a similarity surely indicates that these dies were engraved by a single hand.

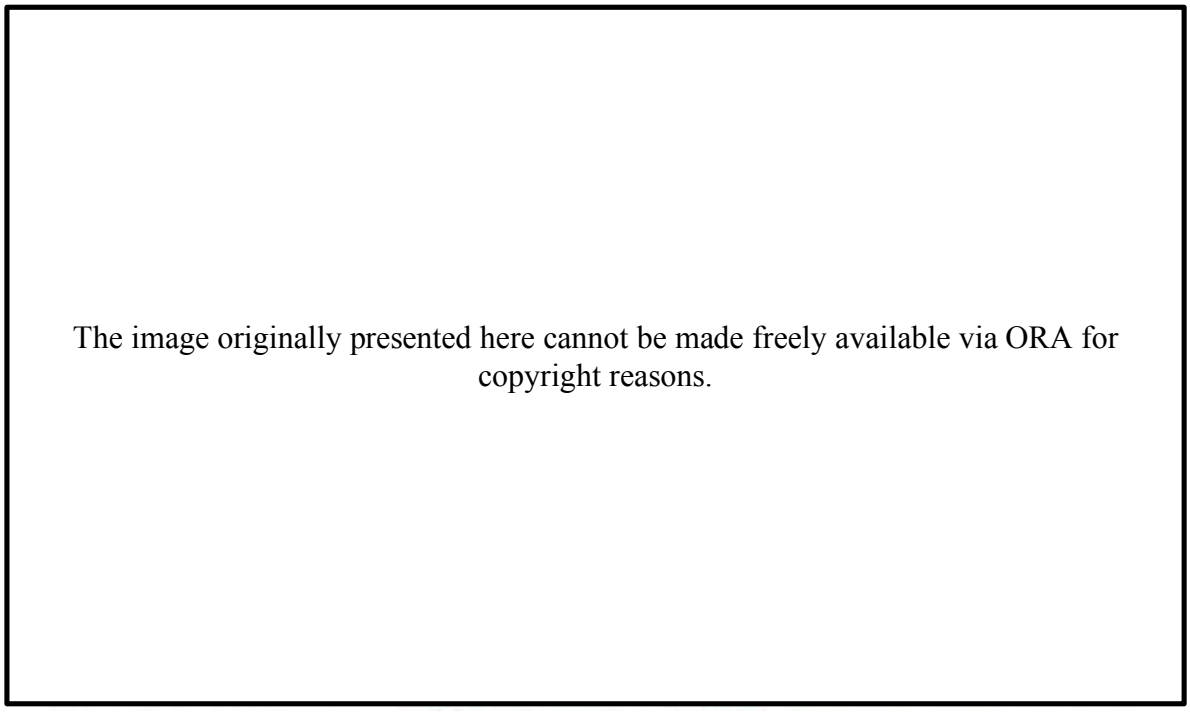


Figure 118: Obverse dies of Antimachus Group I tetradrachms.

Although five of the dies of Group I are remarkably consistent in style, one is clearly very different. This die, illustrated in the bottom left of **fig. 119**, seems to have a style that would fit much better with the dies of Group II since the king's face appears quite different, the brow of the *kausia* is much shorter, and the diadem ties rise and fall in a very angular way not at all like the curved symmetry of those on the other dies of Group I. Despite these sizeable differences I have chosen to include this die in Group I because of the monogram it shares with the other members of the group,

. This die is a link between the issues of Group I and those of Group II, since it shares the obverse style of the coins of the latter group, while featuring the monogram of the former. It is another fortunate link that allows the coins of Group II also to be assigned to Mint B.

Group II ( )

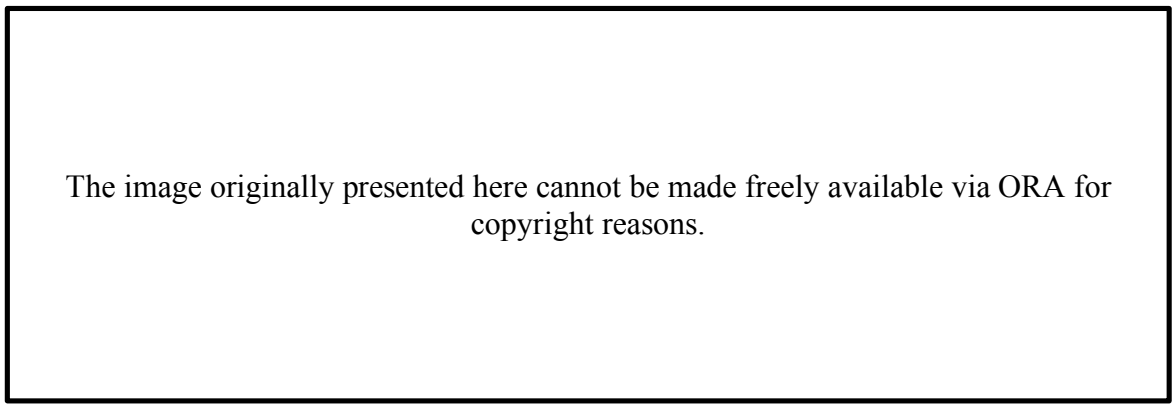
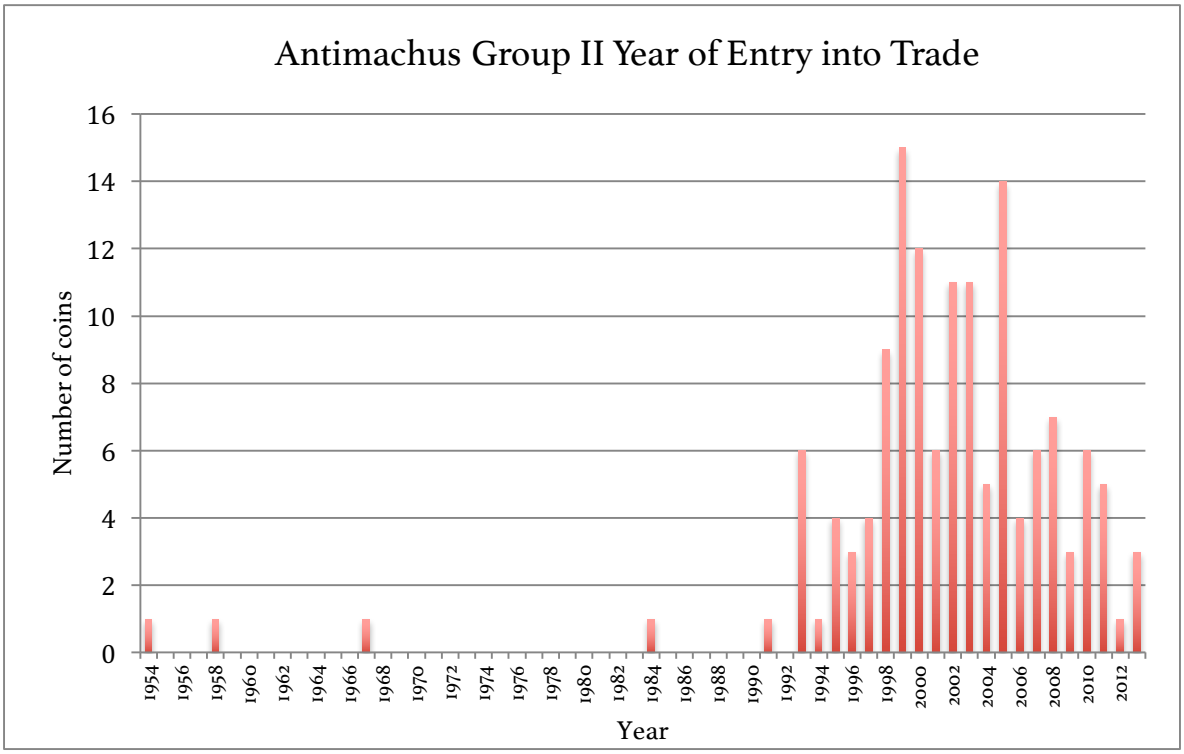


Figure 119: Obverse dies of Antimachus Group II tetradrachms.

Group II has the most examples of all the groups of Antimachus with 152 coins. Twelve dies identified, leading to an n/d value of 12.7, a number noticeably higher than the other groups. Why this group has a better sample size than the others, with many more examples of each die is unclear. Only a small number of the coins in Group II come from known hoards so it is impossible to say whether the sample is being influenced by a large group of die-linked coins that had been hoarded straight from the mint and so had no chance to circulate. The graph below charts the year in which the coins of Group II first appeared on the coin market. Very few coins of this type are held in the large national collections that were mainly acquired in the late 19th and early 20th centuries and it is clear from the graph that the vast majority of the coins of this group have appeared for sale since the early 1990s. Unfortunately, however, there is no clear year in which the coins all appeared on the market, rather a period of a decade or so. In fact the graph is very similar in shape to that of all the coins in the study, which appeared in the Find Evidence chapter. It is quite possible that many of the coins of this group came from a hoard (indeed some share a distinctive patina), which would explain the high n/d, but it seems that they did not all appear on the coin market at the same time. The most likely explanation for this pattern is the second Mir Zakah hoard, which was found in the early 1990s. The

gradual appearance of the coins on the market is probably the result of a filtering process undertaken by dealers to avoid flooding the market with Antimachus tetradrachms and lowering the price of the coins in the process.



Within Group II there are two intricately die-linked groups both of which provide evidence for at least two workstations in use for the production of the coins. As we saw for Agathocles, such a choice is very interesting since it indicates a preference for a quick output even with the associated increase in costs. The two diagrams below represent the process of identifying different workstations which was discussed in the Methodology chapter. The first diagram (**fig. 120**) shows an attempt to organise the die group into a production system that used two workstations, represented by the two lines of obverse dies in the far left and far right of the chart. Reverse dies are then all left positioned in between the two workstations in the middle of the diagram representing the concept of a die box.[414]

In the first attempt at reconstructing the production of this die group with two workstations it became clear that more than two anvils were used in the striking of these coins since it was impossible to produce an organisation of the die links that did not have lines crossing over each other, making the graph non-planar (see the

[414] Esty (1990), 207-210.

link between O51 and R42, for example). This inability to organise the group into two workstations means that more were in fact used, and a system of three anvils is illustrated in the second diagram (**fig. 121**). Here, since the graph is two dimensional in its presentation, the crossing lines do not pose any difficulty of interpretation. It is simply impossible to illustrate on paper any other way. In this group there is evidence of three separate workstations being used in the production of these coins. Such a system requires more expenditure on the minting of the coins than is necessary simply so they were struck faster.

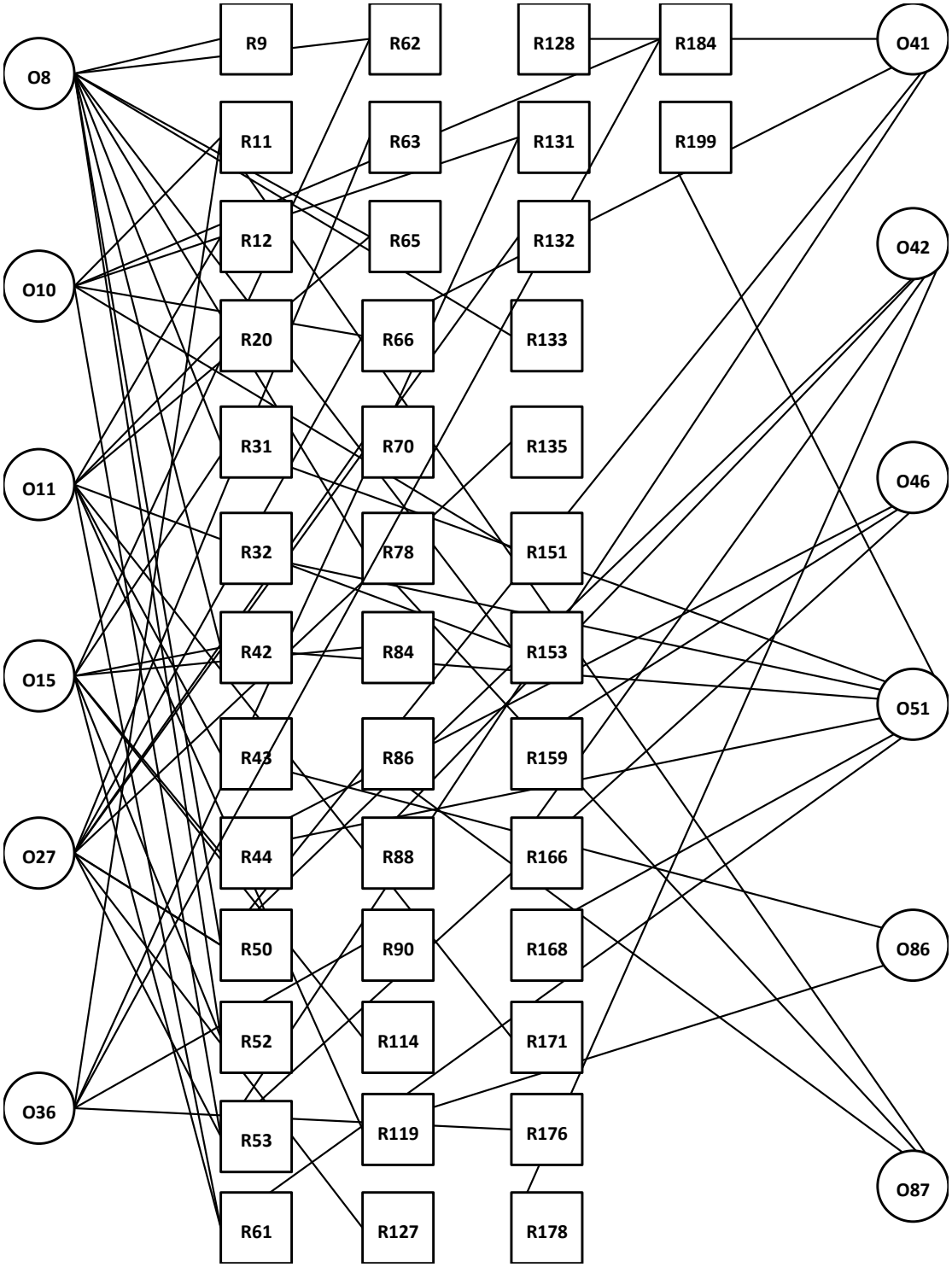


Figure 120: Unresolved Antimachus tetradrachm die group O8.

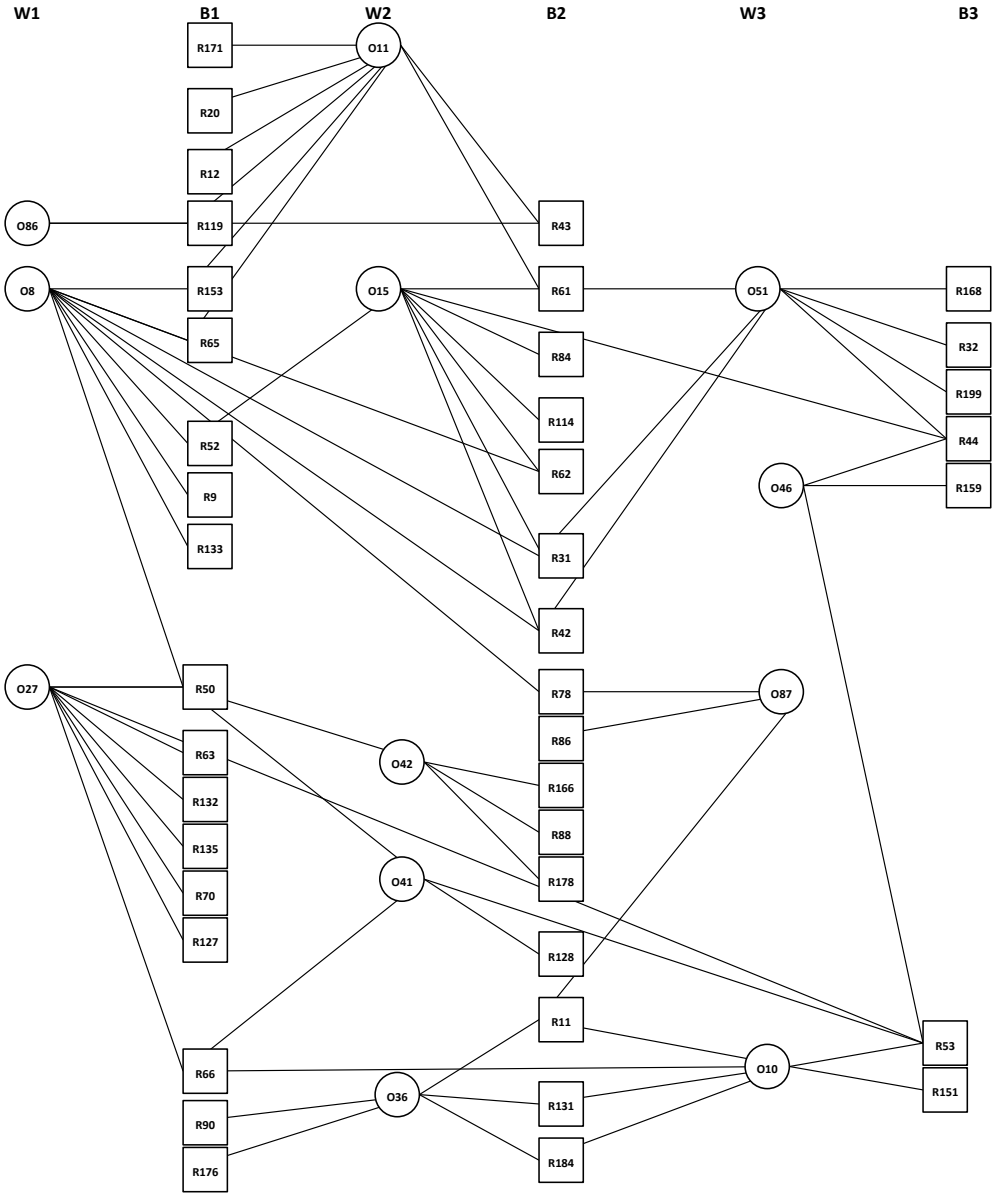


Figure 121: Antimachus obverse die group O8 resolved into three workstations. W=workstation; B=die box.

Examples of the twelve dies used to strike the coins of Group II are illustrated above in **fig. 119**. The style of the face of the king is reasonably consistent, although it is clear that not all of the dies were engraved by the same hand. The depiction of the diadem ties is also interesting since there is no consistent way in which they were

engraved. In two cases the loose pieces of cloth run straight down, almost parallel, from the knot behind the king's head, while in the others they are shown flying back giving a sense of motion. Within this group sometimes the ties almost zig-zag to the edge of the coin, while others are shown in an angular fashion turning unrealistically at right angles. The implications of this variation for any potential prototype are interesting: it seems that the depiction of the diadem ties was left to the individual artist, and was not a proscribed feature of the king's image. Finally, one die of the group (third from the left in the second row) makes use of the bead and reel border, while all the others, both in this group and throughout the tetradrachms have a simple dotted border. All these differences seem to indicate different hands at work, with little involvement centrally as to the smaller details of the portrait, suggesting, along with the use of multiple workstations, a preference for quick production. There does, however, seem to have been a prototype of some sort used in the engraving of the dies of this group since they all seem to have similar facial features, which are rather different from those of the celebrated portrait of Antimachus illustrated at the beginning of this chapter.

Group III (Ⓝ, ⋈, AP)

The third group is much larger in terms of dies, consisting of 34, with a total of 143 coins. The group has three different monograms on its coins although they are by no means equally represented: 139 coins have the monogram Ⓝ on the reverse, while ⋈ appears on two coins and AP only one. These last three coins perhaps deserve a group of their own, but since they share the same style in the obverse portrait as the coins with Ⓝ I have included them in the same group. That style is not quite as consistent as in Group I, at least with regard to the depiction of the king's face. It is very clear here that the dies were engraved by different hands. The one feature of the obverse type that does remain consistent, however, in this group is the way the diadem ties are shown. Here they always hang, almost limply, flat down the back of the king's neck with no illusion of motion at all. For this group it is quite plausible that the engravers were working from a single portrait model, the features of which were accurately reproduced on each die. The diadem is portrayed in the same way on each die, and it is possible to explain the difference in the facial features by way of the various engravers' skills of reproduction, not because each

were working to engrave the king's face in a different way. The coins of Group III all show the king wearing a slight smile and examples of the famous portrait type very often come from this group.[415] The main monogram (Ⓝ) is a particularly puzzling one since it appears on this large group of coins, which all have a consistent style, suggesting a single place of minting, but was used only under Antimachus. Throughout the study, an identification of two mints (A and B) has usually been possible. Here, however, it is far from clear whether the new monogram fits into either system.

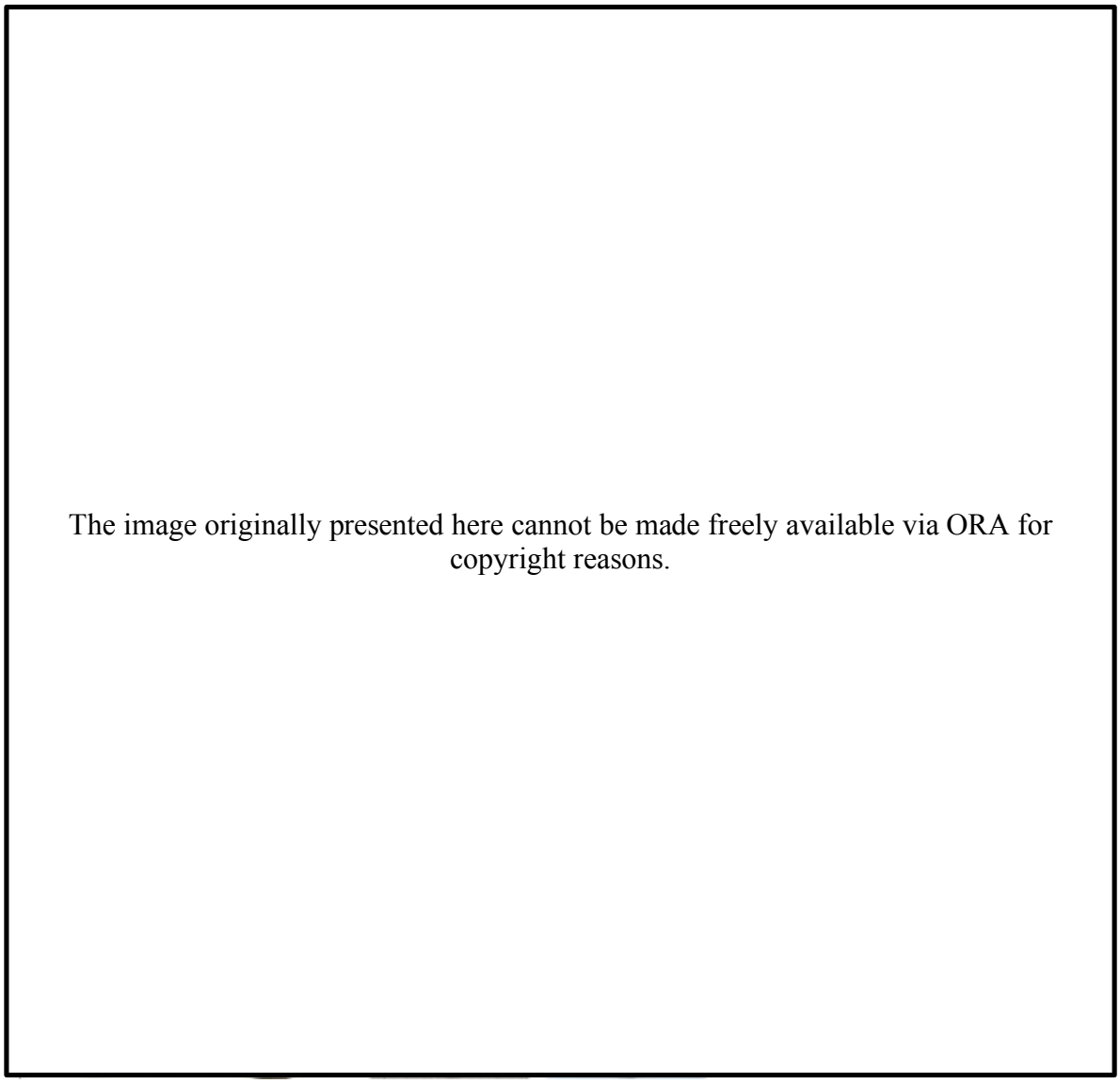


Figure 122: Obverse dies of Antimachus Group III tetradrachms.

[415] See for example Newell (1937), 68; Davis and Kraay (1973), no 143.

The results of the die study indicate that this group was by far the largest of the five, with at least 34 dies used in its production. It is no surprise therefore that the portrait employed here is the one that has become the most recognized and celebrated of all of Antimachus' coins. The balance of production between the different monograms is also interesting. Here one monogram appears used with more obverse dies than all the others put together; the pattern of production does not seem simple and certainly was not regular.

The single coin in the group to include the monogram AP on the reverse is particularly interesting and is illustrated below. The style of the obverse portrait of the king is very similar to the rest of the coins of Group III, most of which have Ⓝ on the reverse. AP appears also on a single coin of the first series of Agathocles' tetradrachms (Spink 28th March 2012, 124). It is odd that the same symbol, which differs from most of the monograms in that it is clearly two distinct letters, should appear on two unique coins that copy the style of types of larger groups of the two kings' coinages. It may be worth treating these coins with some suspicion, at least until further examples appear.

Figure 123: Single tetradrachm of Antimachus Group III with monogram AP (Italo Vecchi Ltd London, 13th September 1996, 618).

Group IV (⋈)

There are far fewer dies in Group IV (ten), all of which include the same monogram (⋈). The style of engraving of the portrait on these coins is closely linked to Group III, although there are subtle differences. In Group IV the proportions of the king's whole portrait are noticeably exaggerated, a feature particularly noticeable on the third die in **fig. 124** on which the king's face seems stretched upward with a much

thicker neck. Other than these minor differences, however, these dies could be part of the third group were it not for the different monogram on the reverse. In particular the way in which the diadem ties fall straight down the king's neck on four of the die is the same as the depiction on the dies of Group III.

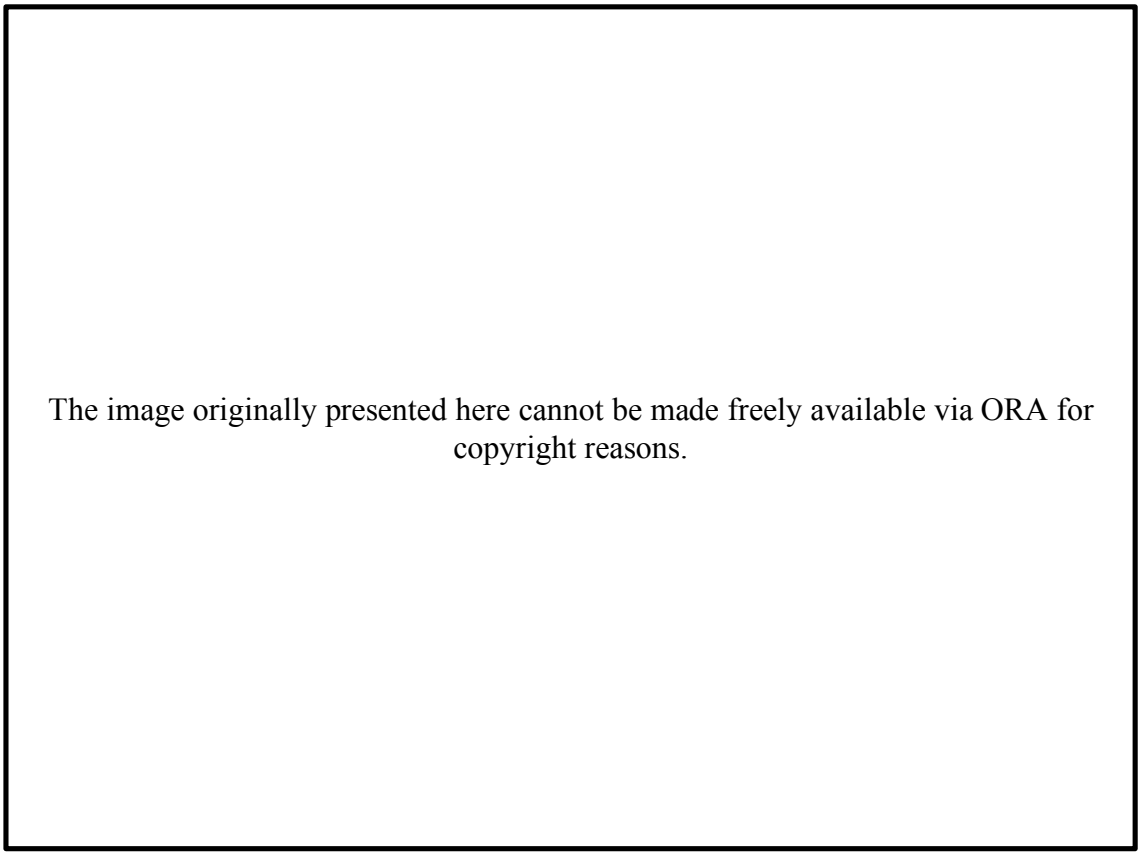


Figure 124: Obverse dies of Antimachus tetradrachms of Group IV.

The diadem ties of the remaining six dies are depicted in a different way, one closer to the fluttering style of Group I portraits. Once again the king seems to smile slightly as on the dies of Group III. It is highly likely that the coins of Groups IV have a close link to those of Group III because of the similarity of the depiction of the king. The nature of this similarity, however, is very difficult to determine. It may be that the connection came about because of a shared prototype, or copying coins themselves. However, it is more likely that the link is one that involved personnel since it is possible to identify the same hands at work in both groups.

One of the particularly confusing features of the coins of Group IV is the occasional appearance of another symbol (Ǝ) on the reverse in addition to the monogram 𐅃. In one case a die group has one obverse linked to five reverses, of which only one has the additional Ǝ. This is an important group for the interpretation of the

monograms since elsewhere in the study there is very rarely evidence of the same obverse die being used with reverses with different monograms. It is very difficult, however, to infer the reason behind the addition of the ∃. It is clear that the symbol was not added to an existing die, that is to say there is no evidence of recutting a die to add the ∃. The only evidence we have is the die group illustrated below. Unfortunately the images of the various reverses are not of the best quality and it is therefore difficult to make out features of the different engraving styles. However, from close examination, it is possible (although not certain) that the final two reverse dies in the group were engraved by a hand different from that which produced the first three. If this is the case it eliminates the possibility that the ∃ indicates an engraver since more than one had been at work. This symbol, since it was used with an obverse die that did not include it clearly had a different status to the full monograms, which were never shared with the same obverse die, indicating a break in production between their use. This symbol was quite the opposite, being added to a new die while an old reverse was still in operation. It may therefore represent an additional control in the production process.

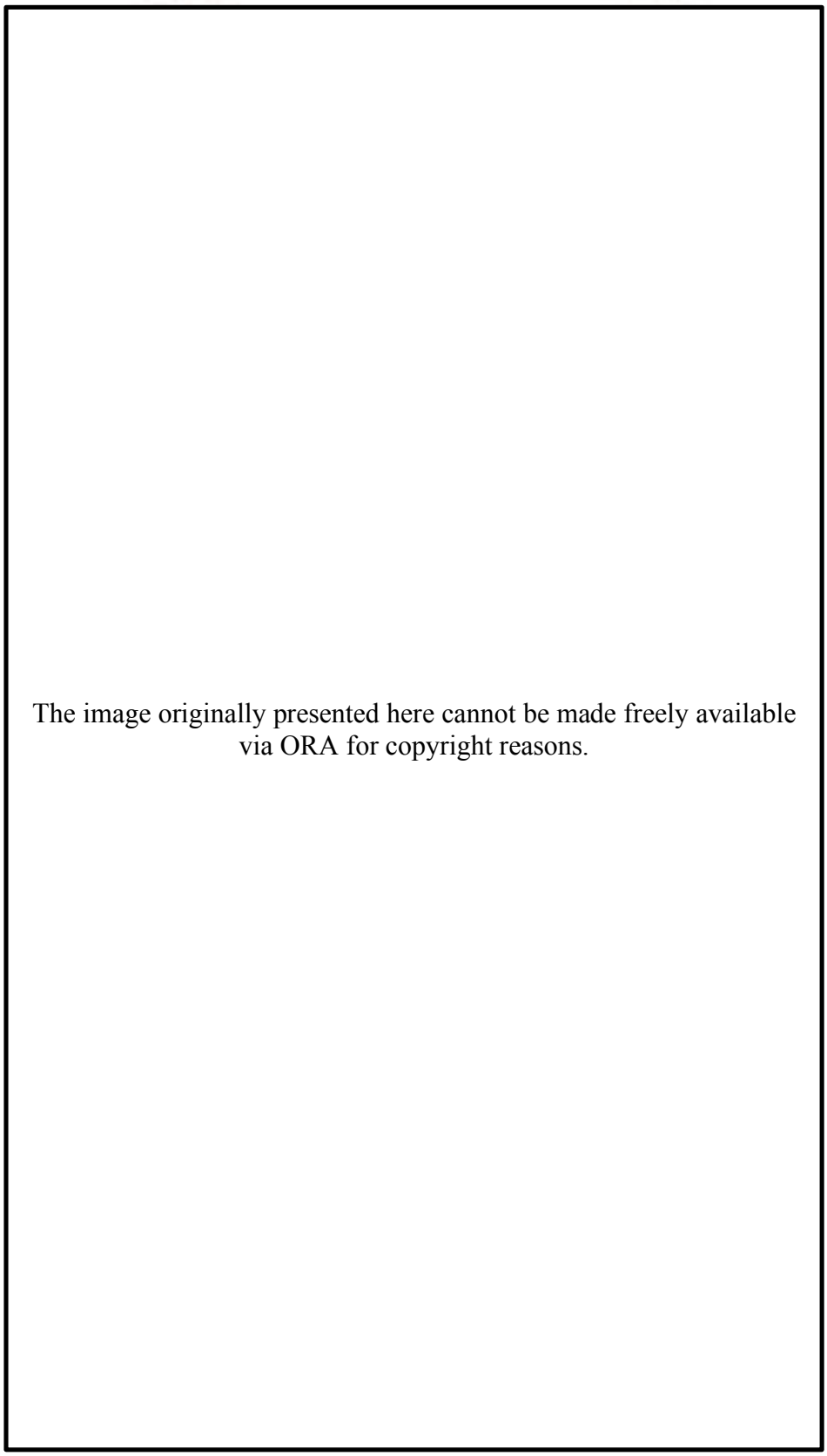


Figure 125: Die group of Antimachus O37. All coins feature 𐌀 but the final coin also has 𐌄 in the left field.

‘Imitations’ ( )

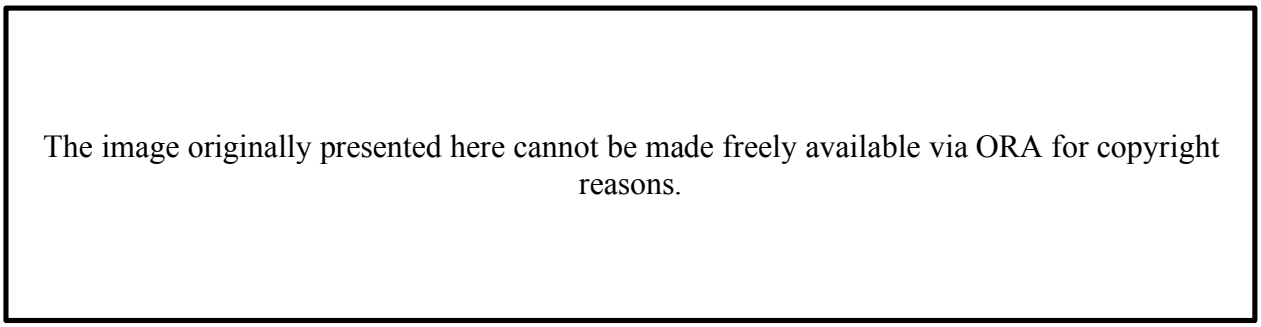


Figure 126: Obverse dies of Antimachus 'imitation' tetradrachms.

Table 45: 'Imitation' Antimachus tetradrachm die statistics.

Type	n	d_o	n/d_o	D_O
Imitation	14	4	3.5	5.6

Monogram	n	d_r	n/d_r
	14	14	1

Although there are minor differences to be found in the style of the engraving, and the depictions of the diadem in the five groups detailed above, there is always a consistent standard. There is, however, one series of Antimachus tetradrachms that look very different. The study identified four dies of this kind, illustrated in **fig. 126**. The style of these coins is much less realistic that those of the other groups. The engraving is less accomplished, with the nose and chin appearing more bulbous, and the eye in particular lacking the realistic life-like quality of the other coins. The diadem ties are also engraved in a different fashion similar to the coins of Group II, with the ties mirroring each other, but this time there are no graceful curves, instead the two lines turn almost at right angles in a very unrealistic fashion. This similarity to the dies of Group II is also reflected in the appearance of furrows in the king’s brow and the extension of the hairline under the brow of the *kausia* as a series of dots. These similarities probably indicate that the model for the dies of the ‘imitation’ series came from a coin of Group II. It is possible that these coins were produced by the official mint during the reign of Antimachus, but with the dies engraved by craftsmen of less skill and with the use of a different control mark, however, in light of the similarity with coinages imitating the types of Euthydemus I and Eucratides I it is more likely that this series should be labeled as contemporary

imitations. Unlike those series, however, the Antimachus imitations do not have a lower average weight (16.61g) than the standard tetradrachms (16.55g).

Figure 127: 'Imitation' Antimachus tetradrachm,16.83g (Ashmolean, Shortt Bequest).

The reverse dies of the coins of this series are also of a very different standard of engraving to that of the other tetradrachms of Antimachus. The letters of the legend seem to merge together and as a result are almost illegible, while the depiction of Poseidon is very different from the usual image of the god on Antimachus' standard tetradrachms with the various distinctive elements of the type highlighted (trident, bearded head, and palm) but not worked together. This feature is another indication of basic copying as the engraver was aware of the separate elements of the type, and gave each attention, but in turn losing the success of the image as a whole. These coins are the result of a process of crude copying of Antimachus' standard tetradrachms. The monogram was not, however, copied by the engravers as these coins have a unique symbol that only appears on this series and not on the issues of any other kings. If these coins were produced as contemporary imitations it is very interesting that the monogram was not simply copied, but a different, unique one was added, an addition that suggests that the monogram served some purpose for those producing the imitations, which may in turn indicate that these symbols had meanings that were understood outside the official mints.

Drachms

Table 46: Antimachus I drachm die statistics.

Type	n	d_o	n/d_o	D_O
Group I	18	2	9	2.3
Group III	36	8	4.5	10.3
Group IV	7	3	2.3	5.3
Totals	61	13	4.7	16.5

Type	n	d_r	n/d_r
	18	9	2
	36	20	1.8
	7	5	1.4
Totals	61	34	1.8

Figure 128: Obverse drachm dies of Antimachus Group III with monogram  .

The drachms collected for this study have three monograms on the reverse ( ,  , ) and have therefore been divided into groups with the same number as their tetradrachm equivalents. Bopearachchi in his *catalogue raisonné* was aware of an additional monogram () represented by a single example in the collection of the Staatlich Museen in Berlin of which I have been unable to obtain an image. The monograms on the drachms are ones that also appeared on the tetradrachms, with a similar link to the style of the obverse portrait. As with the tetradrachms the most numerous group by number of dies is that which include the monogram  with a total of eight (**fig. 128**).

The style of these dies is very close to that of the dies of tetradrachm Group III and it is highly likely that the same artists were at work on both denominations and that the coins were struck roughly contemporaneously. Likewise the drachm dies paired with the monogram Ⓝ have an obverse style which is very similar to that of the tetradrachm dies of Group II in which the diadem ties curve behind the king's head and trail apart. The same can also be said for the three dies with ⋈ on the reverse in that they have obverse styles very similar to those of tetradrachm Groups IV. In short the production of drachms mirrored that of the three main groups of the tetradrachm output, which suggests that, although the output of drachms was much smaller, they were produced alongside tetradrachms by the same personnel and probably in the same location.

Hemidrachms

Table 47: Antimachus I hemidrachm statistics.

Denomination	Number of examples (n)	Weight range (g)	Mean weight (g)	Standard deviation	n/obverse dies	Estimated number of obv. dies	Monograms
AR Hemidrachm	4	1.95-2.08	2.03	0.06	2	n/a	⋈

There are only four hemidrachms in the study and so meaningful conclusions about the original size of the coinage are impossible, although the fact that two dies were used to strike the four coins does not rule out the possibility of a relatively small coinage. Only two monograms are known for this denomination (and ⋈). The omission of Ⓝ is an intriguing detail since it was the monogram used on the largest proportion of issues of both tetradrachms and drachms.

Obols

Table 48: Antimachus I obol statistics.

Denomination	Number of examples (n)	Weight range (g)	Mean weight (g)	Standard deviation	n/obverse dies	Estimated number of obv. dies	Monograms
AR Obol	57	0.31-0.72	0.64	0.07	2.1	51.3	

Table 49: Antimachus obol die statistics.

Type	n	d_o	n/d_o	D_O
Group I	46	17	2.7	27.0
Group III	7	7	1	n/a
Group IV	3	2	1.5	n/a
Group VI	1	1	1	n/a
Totals	57	27	2.1	51.3

Monogram	n	d_r	n/d_r
	44	37	1.2
	8	7	1.1
	3	3	1
	1	1	1
Illegible Monogram	1	1	1
Totals	57	49	1.2

Unlike hemidrachms and drachms obols were produced on a much larger scale with approximately 51 obverse dies indicated as having been used in the original minting. The obols are tiny coins with an average weight of 0.64g they are often less than a centimetre in diameter. Obtaining high quality images of such small coins is very difficult and even those which I was able to photograph myself are often less than clear. The skill involved in engraving such a small area of the die must have been remarkable, and the difficult nature of the task is to be seen in the varying style of the obverses, which are far less consistent than those of other denominations. It is therefore very difficult to identify different groups based on the style of the obols. What is clear is the monogram that appears on the reverse. Three of these ( , , and) are familiar from the tetradrachms and drachms as well as the hemidrachms which included the final two. Once again it seems that a range of denominations was in production alongside each other. Obols were also struck, however, with another monogram () which do not appear on other

denominations minted under Antimachus. This is particularly puzzling and very different from the use of the other monograms. As already noted the mint of Agathocles had not struck obols. It is possible then that the large production of obols under Antimachus, with different administrative systems used especially for the smallest silver denomination, was a reaction to a limited supply of these tiny and thus easy to lose coins. The fact that two different monograms were used only for the production of obols under Antimachus suggests that there was a time that the mint was only producing that denomination.

Bronze

Table 50: Antimachus I copper system.

Denomination	Number of examples (n)	Weight range (g)	Mean weight (g)	Standard deviation	n/obverse dies	Estimated number of obv. dies	Monograms
Circular							
AE Double	22	6.54-8.48	7.66	0.53	1.6	38.5*	
Rectangular							
AE Denomination 'A' 'Large module'[416]	8	9.13-12.7	11.02	1.19	1.3	n/a	-
AE Denomination 'B'	7	2.01-2.82	2.53	0.34	1.8	n/a	-

[416] Bopearachchi (1991), 186 identified two separate series (6 and 7) based on a difference in weight and a variation in the orientation of the obverse type.

Table 51: Antimachus I AE double die statistics.

Type	n	d_o	n/d_o	D_O
Group I	15	11	1.4	n/a
Group VII	3	1	3	1.5
Group VIII	4	2	2	4
Totals	22	14	1.6	n/a

Monogram	n	d_r	n/d_r
	14	13	1.1
	2	1	2
	4	3	1.3
Illegible	2	2	1
Totals	22	19	1.2

Figure 129: AE double unit of Antimachus I, 7.26g (Ashmolean, Hollis Collection).

The bronze denominations struck under Antimachus are rather puzzling, and few examples survive. They do, however, fit much more closely with the silver denominations than the base metal coinages of the earlier kings. One denomination is a circular double unit bronze coin of the kind minted under both Euthydemus and Demetrius, and of the same weight as the cupro-nickel coins of Euthydemus II, Pantaleon, and Agathocles (**fig. 22**). The types are rather different, however, with an elephant on the obverse and Nike on the reverse. The legend also differs from the king's silver issues in omitting *theos*, simply reading: ΒΑΣΙΛΕΩΣ ΑΝΤΙΜΑΧΟΥ. This denomination is not particularly well represented in the study with only 22 examples included, with 14 different obverse dies identified, giving an n/d of 1.6, a far from complete sample. The estimate of the original number of obverse dies of

38.5 should therefore be treated with caution. Establishing die identity for these coins was challenging, as so often the case with the bronze issues of this study, since the level of preservation was regularly quite poor. **Fig. 130** shows one example of each of the obverse dies identified, with the degraded state of the coins being quite clear. Conclusions about the original size of the coinage are difficult and not possible with the current state of evidence.

The double units include one of three possible monograms ( ,  , ) on the reverse, two of which also appear on the silver denominations.  appears on every denomination of Antimachus' coins that uses monograms, while  is attested on a single tetradrachm, and  is only present on the bronze double units. Within the bronze double denomination  is by far the most popular monogram appearing on 13 reverse dies, while  is only present on one and  on three. Such a variety in the way the monograms are used is puzzling and makes a consistent explanation difficult. The  doubles may have been produced relatively early in the reign of Antimachus alongside the tetradrachms of Group I which share the same monogram, only for smaller issues to be struck later with the other two monograms to maintain a certain level of supply of bronze coinage.

Figure 130: Obverse dies of Antimachus AE doubles.

Non-Greek issues

The rectangular issues of Antimachus (*BNBact* séries 6,7,8) are particularly problematic as well. For both large and small module denominations I was only able to find 15 examples in my study. This is probably indicative of the rarity of these denominations, although it should also be remembered that it was only recently that bronze coins began to appear in commercial numismatic publications on a regular basis thus limiting the availability of images of these coins. Although the small number of examples of these two rectangular denominations makes estimating the original number of dies used in their production impossible, the number of dies I was able to identify gives some indication as to the size of the output. For the small module denomination I identified four dies from the seven coins (n/d of 1.8), while the eight coins of the large module type produced six dies (1.3). Even with such small numbers the fact that there was evidence of die linking suggests that the original output of these denominations was not massive. These coins are rectangular and feature an elephant on the obverse with a thunderbolt on the reverse. Despite being rectangular in shape, they are unlike Agathocles' Indian standard bronze coins in only having a Greek legend, yet their shape clearly makes them intended for a non-Greek monetary system.

These denominations, like the bilingual issues of Pantaleon and Agathocles, have been linked to a Greek presence in Taxila. Part of the basis of this supposition is a clear stylistic similarity between these issues of Antimachus and rectangular bronze coins with an elephant and horse that have been attributed to Taxila (**fig. 132**). This similarity, along with a coin of Taxila apparently countermarked with Antimachus' title and thunderbolt device, has been used to support a theory that Antimachus temporarily occupied Taxila.[417] The coin illustrated in the reference given by Allan (*BMC* pl. xxxii, 21), however, shows no indication of countermarking of any sort. The stylistic similarity in the depiction of the elephant, particularly with the small module Antimachus coins, is clear. Although there is quite a large variation in weight it also seems that the large module Antimachus rectangular issues and the 'Taxila' coins share the same weight standard, one that may be linked to that of the karshapana. The coins also share the same method of production; chisel marks

[417] Allan (1951), 856.

show that they were cut from bronze bars. Once again the lack of a monogram suggests, along with the production technique, and the very poor execution of the reverse legend (see **fig. 131**) suggest that these coins were made at a non Graeco-Bactrian mint.

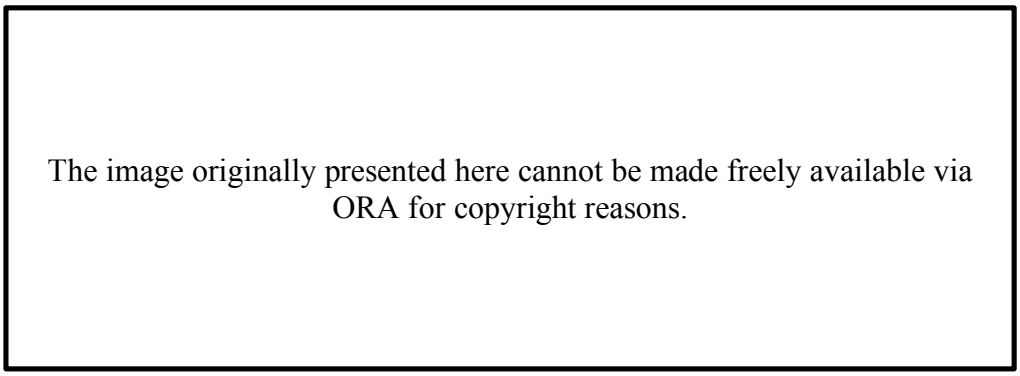


Figure 131: Antimachus AE of unknown denomination, 2.16g (BM 1954.0211.1).

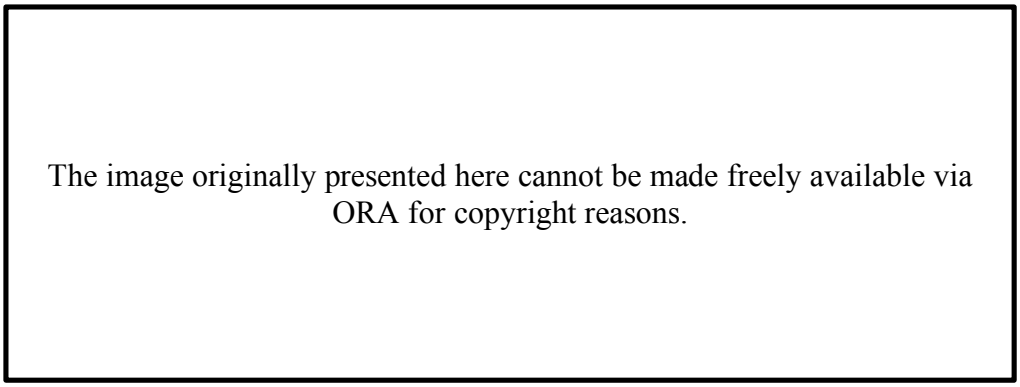


Figure 132: 'Taxila' bronze (private collection).

Whether these coins can be linked so certainly to Taxila is not so clear. The issues with the elephant and lion and the elephant and horse types were originally attributed to the Taxila area on Cunningham's authority.[418] Such an interpretation has recently been challenged and it is even possible that the date of these coins should be moved later.[419] A link to Taxila is now far from certain, but it is highly likely that the rectangular coins of Antimachus, like those of Pantaleon and Agathocles were produced to fit into the non-Greek monetary system south of the Hindu Kush.

[418] Allan (1936), cxxv.
[419] Bhandare (forthcoming).

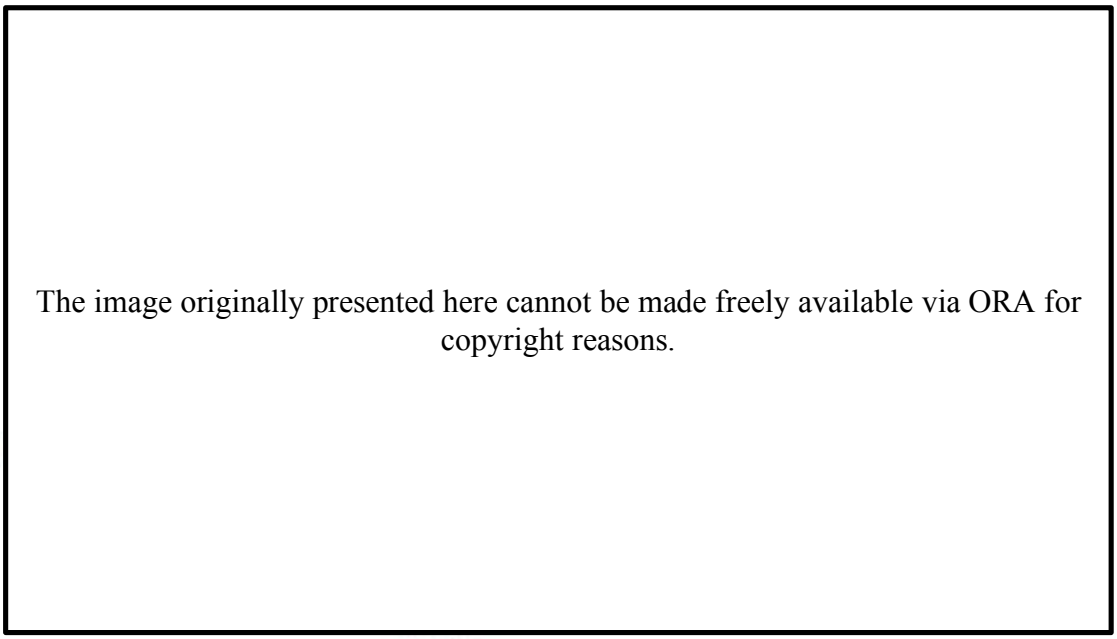


Figure 134: Obverse dies of Antimachus AE large modules.

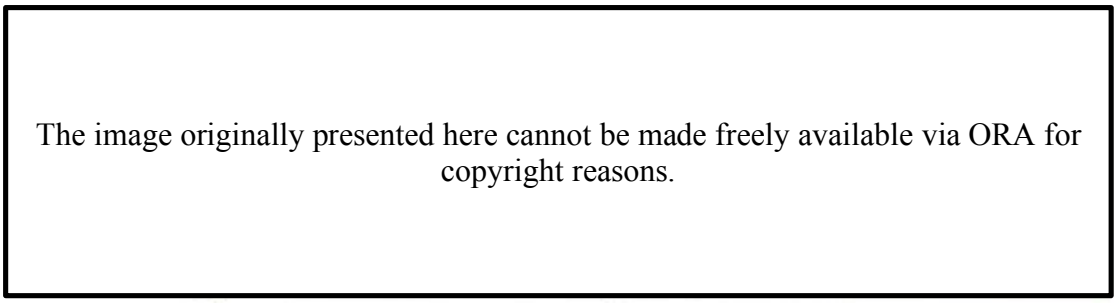


Figure 133: Obverse dies of Antimachus AE small modules.

Summary

The results of the die study of Antimachus' coins have been particularly revealing, thanks mainly to a number of fortuitous discoveries. We have seen that the pedigree coins were issued only for a very short period of time at the start of the king's reign, perhaps under a different administrative system than that used for the rest of his coinage. The reason for the striking of pedigree coins under Antimachus seems to have been a practical one, allowing the mint to continue to strike coins until it had received instructions from the new king as to his preferred coin types. Speed seems to have been a recurrent theme in the production of Antimachus' coinage, with a system of minting that involved at least three separate workstations striking simultaneously at one point, while the dies were engraved by multiple engravers with some variation in the rendering of the portrait model.

The smaller silver denominations were struck alongside the tetradrachms, in most case featuring the same monograms, and very similar engraving styles. The production of obols, in particular, seems to have been high, perhaps to compensate for the earlier lack of this denomination under Agathocles. The circular bronze coinage was a sizeable issue, but the double unit was the only denomination to be struck, while a lack of cupro-nickel coinage probably indicates a different source of metal for the base coinages, since the same denomination continued to be produced under Antimachus only in bronze. The most puzzling of Antimachus' coins are the rectangular large and small module coins of an unknown denomination. Few survive, and it is difficult to know for what purpose they were struck. The king's rectangular issues, however, cause much greater difficulties in interpretation since so few examples survive and provenance is unavailable. Being bronze coins, and within the Indian tradition of a rectangular flan, they presumably circulated south of the Hindu Kush. Their poor execution of the legend and lack of a monogram suggest they were also produced there, or at the very least were not made in the same place as the Attic standard coins. Their Greek only legend is a particular problem since Pantaleon and Agathocles and both earlier produced coins with the legend also written in the Brahmi script. Why the local language was omitted on these coins is unclear.

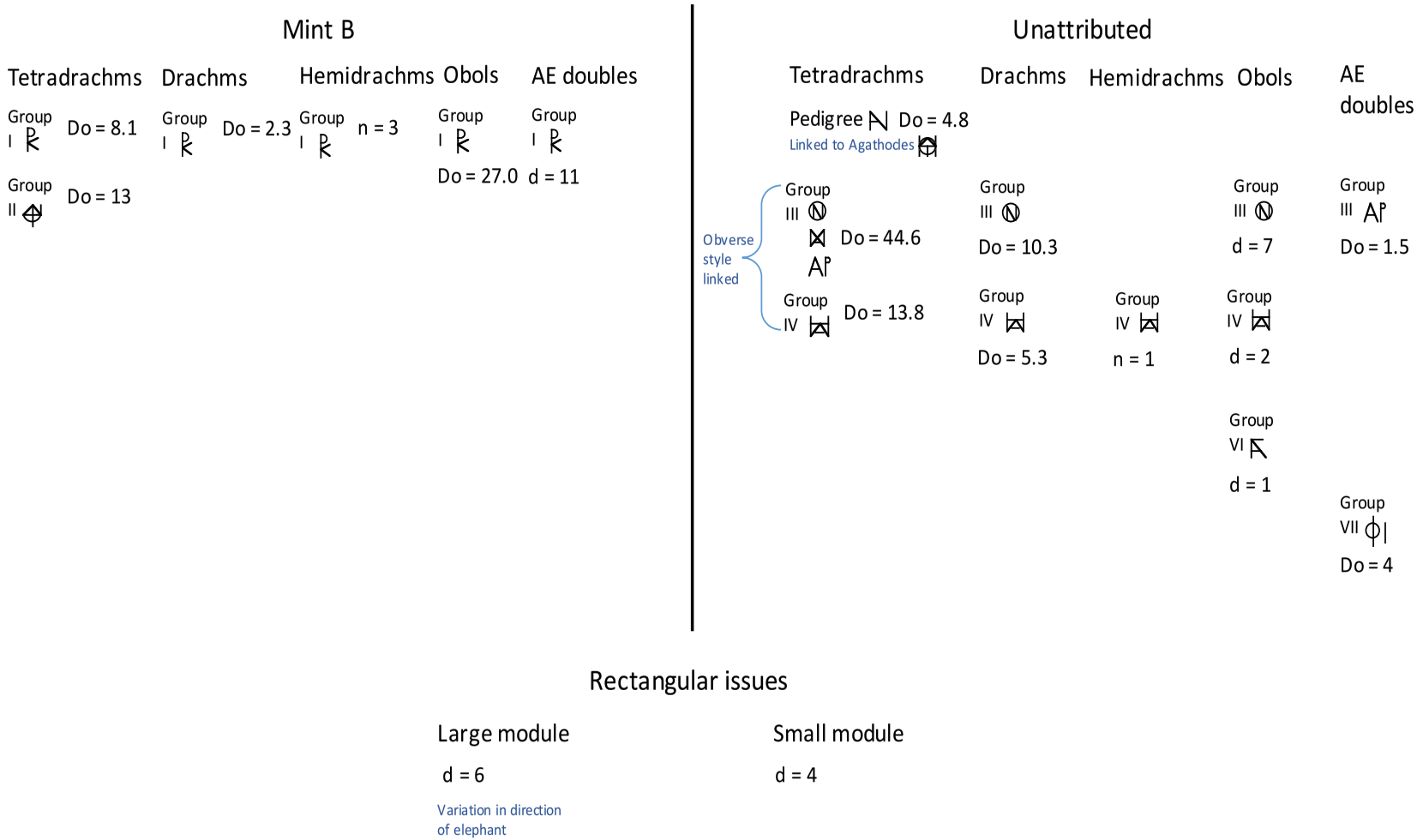


Figure 135: System of production under Antimachus I.

Chapter IX: Monograms

Throughout this study the meaning of the symbols that appear on the reverses of the vast majority of the coins has not been fully considered. They have been taken as representative of the personnel involved in production, and two main monograms ( and ) have been identified as the major marks of the two mints striking throughout the period. The starting point for this interpretation was the models of the coinage of the Diodotoi developed by Holt and Kritt.[420]

Monograms appear on the reverse of the majority of coins in the current study; they are only absent from some issues of Euthydemus I as well as the non-Attic standard coinages of Pantaleon, Agathocles, and Antimachus. The full meaning of these symbols is not known and they have long been recognised as being of great importance to the interpretation of the coinages.[421] More than any other aspects of the study of Graeco-Bactrian coins, attempts at explaining the meaning of the monograms are hampered by the isolation of the numismatic evidence. There are no inscriptions or other sources of documentary evidence that provide an insight into administrative procedures, while the lack of secure find spots for the coins negates the possibility of assigning monograms to geographical areas as has been done with Seleucid coinages.[422] Indeed many other Hellenistic coinages make use of similar symbols and monograms, [423] and attempts to understand the control marks on these coinages, the historical context of which is better understood, are a useful comparison and starting point for the Graeco-Bactrian issues.

François de Callataÿ has surveyed the various explanations for control marks on Hellenistic royal coinages, dividing them into two categories: personal and non-personal, a distinction that will be used below.[424] He rejected a number of potential explanations.[425] The interpretation of control marks as signs of the engraver of the dies was dismissed. Engravers being indicated on dies is a feature missing from the Hellenistic world. With the possible exception of the early coinage of Ptolemy there

[420] Holt (1999); Kritt (2001); Kritt (2015).
[421] Gardner (1886), lv.
[422] Houghton and Lorber (2002), xxi-xxii.
[423] Mørkholm (1991), 31; Le Rider and Callataÿ (2006), 58-60.
[424] Callataÿ (2012), 40-41.
[425] Callataÿ (2012), 41-47.

was no return to the explicit signatures of classical Sicilian coinage.[426] This suggestion can be omitted from further consideration in this study, because of a number of instances of the same hand cutting dies with different monograms. Liturgies were also dismissed, partly because of a lack of epigraphic evidence in the Hellenistic period, but also the enormous financial cost to an individual of donating silver for a large coinage.

Callataÿ also rejected an hypothesis proposed by Martin Price, who, in relation to the coinage of Alexander, suggested that the control marks were indicative of batches of metal.[427] The lack of such indications on earlier coinages weakens this theory, with no explanation as to why it would suddenly have been adopted. In addition, Callataÿ remarks that '...people did not care about provenances. They cared greatly about quality: not to buy poor silver for the mint and not to risk a death penalty for issuing silver coins with a metallic content under the prescription.'[428] The users of the coins, and the issuer, would indeed have cared greatly about the quality of the metal, a point to which we shall return later. Finally, the interpretation of the monograms as the names of 'magistrates' was dismissed on the basis that very rarely do full names of such officials appear on Hellenistic issues, and those on which they are present are not royal coinages.[429] As we shall see, this comparison is a pertinent one for Graeco-Bactrian coinages and has been suggested by previous scholars.

Attempts at interpreting Graeco-Bactrian and Indo-Greek monograms have a long history. Alexander Cunningham was one of the first to tackle the problem of the meaning of Graeco-Bactrian monograms in a systematic way. He attempted to identify the constituent letters of each monogram and then assign them to a geographical location.[430] This approach resulted in over 150 'identified' mints. For example he expanded  into either 'ΩΦΙανης or ΟΦΙανης, for *Alexandreia Opiane*, or the Caucasian Alexandria, which was situated at the τριοδον, or meeting of the three roads from Bactriana, Ariana, and India. *Hupiân* or *Opiân* still exists near

[426] Faucher (2013), 96-99; Berthold (2013), 276-283.
[427] Price (1991), 34.
[428] Callataÿ (2012), 46-47.
[429] Callataÿ (2012), 42.
[430] Cunningham (1884).

Châriкâr, about thirty-six miles to the north of Kabul.'[431] The arbitrary nature of such a method is clear. How are the monograms to be expanded? For example, are monograms  and  made up of the same constituent letters, and if so what are those letters? Perhaps the circle with a vertical line through it represents an omicron and an iota (O, I), but why not a phi (Φ)? In the case of  , do the two diagonal lines form a lambda (Λ), or, with the base of the circle, is it intended that a delta (Δ) or perhaps an alpha (A) is to be understood? Interpretations that rely on a method of expanding and 'reading' the monograms are therefore doomed to failure.

It is only possible to identify these monograms as symbols in their own right, no matter what initial letters of any particular word they may form. Attempts have also been made to classify the monogram by the 'principle Greek letter', with the presumption that this indicates a personal name.[432] Elsewhere in the Greek world monograms were constructed with the first and last letter of the name.[433] Such an approach to these coins encounters the same difficulties mentioned above and is made impossible by the lack of epigraphic evidence from Bactria. In the current study no attempt is made to expand and read the monograms and they are considered simply as symbols.

The main difficulty in interpreting the monograms is the lack of consistency in the way they appear on coins, with some used extensively over what was presumably a long period of time, while others are remarkably short-lived. On the one hand,  is found on silver, bronze, and cupro-nickel coins of all the kings in the current study, with the exception of Pantaleon. It is also known from the coins of later kings: Antialcidas, Apollodotus I, Archebios, Epander, Eucratides I, Heliocles, Lysias, Menander, Philoxenos, Polyxenos, Agathocleia and Strato, and Strato as sole-ruler. On the other,  appears only on the bronze 'sextuple units' of Demetrius I. The first to attempt a full classification of the monograms was Simonetta, who published his identifications in two separate articles alongside a commentary of Bactrian and Indo-Greek history, which all too often relied on Tarn for its

[431] Cunningham (1884), 60.
[432] Dani (1992), 101.
[433] Picard (1979), 88.

narrative.[434] Simonetta did not construct a new hypothesis for the interpretation of the monograms, instead following Tarn in identifying them as 'signatures of magistrates or of moneyers'.[435] The longevity of certain monograms was explained as being indicative that the position could have been an hereditary one.

The multi-volume catalogue produced by Michael Mitchiner offered a different approach to the monograms, one which assumed they represented mints in certain geographical locations. He preferred to look at the Graeco-Bactrian series as a whole to identify patterns between kings whose coins share monograms, and noting from which kings' outputs that mark was absent. For example for the attribution of the monogram  , an *argumentum ex silentio* is employed. Since Merv was a city in the west of the Graeco-Bactrian kingdom, Mitchiner identified kings whom he thought would not have controlled the area, such as Euthydemus I (whose coins do not include this monogram), who would have been driven further east because of the invasion of Antiochus III and would therefore not have minted coins at Merv.[436] Such an approach very quickly becomes circular and is one that relies heavily on fanciful historical narratives and unfounded assumptions about the extent of the kingdom at various times.

In his *catalogue raisonné* Bopearachchi provided an hypothesis that slightly refined the earlier suggestion that the monograms indicate magistrates or moneyers. He theorised that the marks were a sort of trademark of private enterprises that were contracted to produce the coins.[437] Such an explanation is rather cumbersome and Bopearachchi was unable to provide any evidence to support it.

As we have seen, attempts to identify the function of the monograms have often looked at the whole range of Graeco-Bactrian and Indo-Greek kings, with no consideration given to quantification of the different symbols. Table 52 shows the monograms used on coins of different metals and denominations under each of the six kings in the study. The problem of interpretation quickly becomes clear. Some

[434] Simonetta (1957) and Simonetta (1958).
[435] Simonetta (1958), 53.
[436] Mitchiner (1975), 339.
[437] Bopearachchi (1991), 33. Bopearachchi's term for this is *raison sociale*, a phrase meaning 'company name'. In his review of *BNBact*, Holt ((1992), 218) uses the word 'trademark' to express the meaning in English.

monograms () are found on coins of multiple denominations and metals of nearly every king, while others () are found only on a single denomination of one king. Others still () appear only on coins of two consecutive kings. Such a pattern points strongly to a personal explanation of the monograms, with different individuals being responsible for a certain issue of coins. A consistent non-personal interpretation would lack such variety in the employment of different monograms. It should also be noted that only one control mark () appears on non-consecutive kings' issues.

Table 52: Use of monograms from Euthydemus I to Antimachus I.

	Euthydemus	Demetrius	Euthydemus II	Pantaleon	Agathocles	Antimachus
	st/dr					
 TI	4					
	dr		ob			
	4					
	4					
	4					
	st/4/dr					
	oct/4/dr	4/ob/AE2				
 A	4					
 N	4					
	4/dr/AE2, 1, 0.5	4/dr/ob/AE2/AE3	4/dr/ob/Ni2		4/Ni2/Ni1	4/dr/hdr/ob/ AE2
		4/ob/AE2/AE3	4/dr/hdr/ob/Ni2/Ni1/ AE2/AE3	4/dr/Ni2	4/dr/Ni2/Ni1/ AE2	
			Ni3/Ni2			
		4/dr/AE2	4	AE2	4/dr/AE2	
		dr				
		4				
		4/dr/AE2				
		AE3	4/dr			
					4	
						4
					AE2	4/AE2
						4/dr/hdr/ob
 E						4
						4/dr
						4
						4
						4/dr/ob
	AE2					
	AE1					

	Euthydemus	Demetrius	Euthydemus II	Pantaleon	Agathocles	Antimachus
	AE1					
		AE2/AE3				
		AE2				
		AE3				
		AE6				
					Ni2	AE2
				Ni2		
None (Attic standard only)	4/dr/ob/AE2, 1, 0.5, 0.25					
Denominations: oct = octodrachm; st = stater; 4 = tetradrachm; dr = drachm; hdr = hemidrachm; ob = obol; Ni 2 = CuNi 'double' etc.; AE 2 = 'double' etc..						

Over the course of the die studies of the six kings certain features of the coinages that provide an insight into the meaning of the monograms were identified. The most important being the very rare identification of obverse die linking. On very few occasions was the same obverse die used with reverses with different monograms. The most important example of such a link is that identified between the Agathocles pedigree tetradrachms () and the Antimachus series (). The lack of obverse links suggests that there was a break between the use of monograms, with the obverse dies destroyed at the end of their use. The monograms that appear on the pedigree coins were new control marks, different from those found on the coins of the kings whose types were being used.[438] Likewise the 'imitation' coinages copying the types of Euthydemus I and Antimachus do not copy the monograms as well, preferring to include a new mark of their own. The monograms clearly had an important function, one of which even those producing coins outside the official mints were aware.

The marks had not, however, always been so important. They do not appear on the earliest coins of Euthydemus I. They are also absent from all rectangular coins issued from Pantaleon on. This latter absence may indicate simply a different

[438] As mentioned above, however, the symbols that appear on the original coins, such as the wreath on the issues of the Diodotoi were copied by the engravers of the pedigree coins.

organisation of the production process, but it should be noted that the vast majority of these coins were copper issues, only Agathocles' 'Vasudeva' coins were struck in silver without a monogram. Under later kings, such as Apollodotus I, for whom silver coins were struck on square flans to a non-Greek weight standard, monograms reappeared.

A convenient summary of the various hypotheses proposed in relation to Graeco-Bactrian and Indo-Greek coins was provided by Guillaume.[439]

> 1. mark of a magistrate, of the moneyer or of the head of the workshop;
> 2. mark of a 'mint-city';
> 3. mark of an *officina* (there may have been several *officinae* in the same 'mint-city';
> 4. mark of the king;
> 5. date;
> 6. mark of the engraver [of the die];
> 7. issue number;
> 8. die number;
> 9. cast number.

Immediately the final two suggestions can be dismissed since many more dies than monograms have been identified in the current study. Likewise the proposals for issue number, date, and mark of the king can be removed from consideration, as can the mark of the engraver. This leaves the first three hypotheses. Of these we should also reject the suggestion of *officinae* at least for the more prevalent monograms. Cowell's analysis of the metal of the cupro-nickel issues identified different concentrations of trace elements between coins with  and those with  . Different workshops within the same mint are unlikely to have refined the metal for the blanks in a different way, suggesting that different monograms imply different locations.

[439] Guillaume (1990), 99.

The most likely explanation of the monograms is that they had some sort of quality control function, identifying the person responsible for the striking of that particular issue. We have no details about the organisation of the production of coins in Bactria, but it is safe to assume that there would have been an official ultimately responsible for the striking of coins. It seems that this official (the term 'magistrate' holds connotations of a particular office and length of term for which we have no evidence) would have been responsible for as large or as small an issue of coins as was required. The symbol that was used would not necessarily have to have corresponded with the actual name of a particular individual so long as records were available to cross-check each monogram with the official responsible for that issue. This goes some way to explaining the longevity of certain monograms, although the large variety of their use defies a simple explanation.

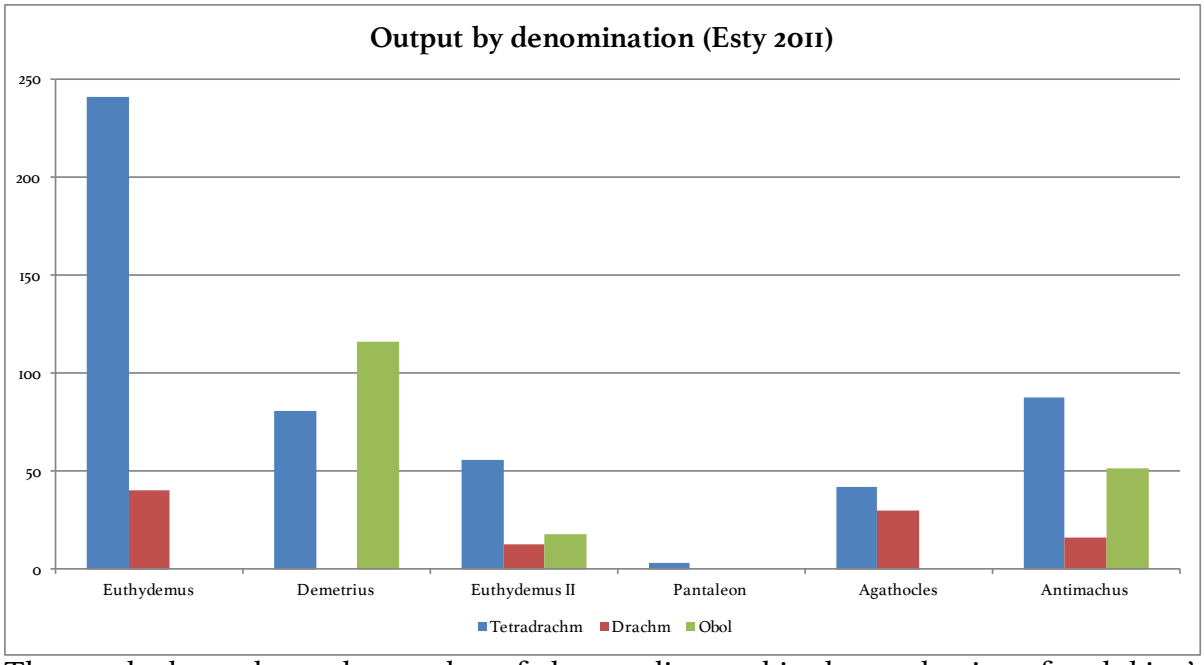
Conclusion

So far the results of the die studies of the coinages of each of the six kings have been discussed separately. It is clear, however, that many of the most important and interesting conclusions to be drawn from the material gathered will come from a comparison between the numismatic output of the kings. Beyond this further insight can be found in a comparison with other coinages, mainly from the Hellenistic world, for some of which we have a better historical context. For Graeco-Bactrian comparisons, the existence of Kovalenko's die study of the coins of Diodotus I and II provides a very useful body of evidence, although it is now somewhat out of date with the appearance of so many coins since its publication.[440] My own previous study of the silver coinage of Eucratides I as well as coins now attributed to Heliocles and Laodice will provide a partial numismatic picture of the later Graeco-Bactrian period.[441]

Output

The most fundamental outcome of any die study is the calculation of the number of dies used in the production of the coinage. In each chapter internal comparisons have been made based on the number of obverse dies identified (d) and, in those cases with a sufficient sample, an estimate of the original number of dies (D). Such figures are interesting within the output of each king, but their main utility comes in their use for comparisons of the size of the coin output of different kings.

[440] Kovalenko (1996).
[441] Glenn (2011); Glenn (2014). Both studies were completed without access to the libraries of commercial numismatic publications used here. They should therefore be considered preliminary, they can still, however, provide some quantification of the respective coinages.



The graph above shows the number of obverse dies used in the production of each king's silver coinage as calculated with Esty's 2011 formula. Different denominations are indicated with different coloured bars. It is clear that the output of tetradrachms under Euthydemus I was by far the largest of all the kings. At the other end of the scale, Pantaleon's production is almost negligible. The tetradrachm was also the major denomination issued under all kings, with the exception of Demetrius, whose large production of obols is different. Nevertheless, a substantial number of tetradrachms were also produced. Such a large output of obols is unusual, even surprising, because smaller denominations were, in relative terms, more expensive to produce, with the same costs involved in the production of a lower value coin.

Throughout the study it has been possible to assign coins to one of two mints with some certainty. In addition to Mints A and B, some denominations seem to have been struck at a separate location, or locations. To avoid any assumption that these coins are all to be considered issues of a single mint they have been referred to throughout as 'unattributed'. The chart below shows the progression of the production of tetradrachms over the period covered by this study.[442] The three 'mints' are represented by three columns with a single block representing approximately five obverse dies. The series and groups are arranged chronologically as far as is possible, with different groups separated by a space, the reason for the separation labelled on the left of the table. The resulting picture is actually a rather surprising one. Under Euthydemus I the bulk of initial production with the first portrait

[442] Unfortunately, the tetradrachms were the only denomination with a sufficient sample to make such a comparison possible.

model took place at Mint A, with most of the output switching to Mint B with the appearance of model 3. Under Demetrius and Euthydemus II, however, production seems to have been balanced with a similar output of tetradrachms at both mints. As we have already seen, the silver output of Pantaleon was very small and was only produced at Mint A. For Agathocles, the picture is quite different, and we have a chronological order for the use of mints again. Production started at Mint A before switching to Mint B, while the pedigree coins were produced at both mints. In addition a third group of this series is found, although this may be tentatively linked to the output of Mint A through stylistic similarities, I have preferred to label it separately since the major monogram of Mint A () reappears on the coinage of Eucratides I, a king whom the use of epithets may suggest was contemporary with Antimachus. It is only under Antimachus that we see a significant change from the previous use of mints A and B. The very first issues, the small production of pedigree coins are unattributed. Likewise the majority of the standard tetradrachms feature monograms that cannot be attributed to either Mint A or Mint B, and may no even represent a single mint in themselves. We do, however, find an output of tetradrachms at Mint B under Antimachus.


Comparison of tetradrachm mint output (obverse dies)
Mint A
Mint B
Unattributed
= c. 5 obv. dies
Euthydemus
Portrait Model 1
Portrait Model 2
Portrait Model 3
Portrait Model 4
Demetrius
Group I / III
Group II
Group IV / V
Euthydemus II
Group I / IV
Group II / III
Pantaleon
Group I
Agathocles
Series One
Series Two
Pedigree
Antimachus
Pedigree
Group I / III
Group II
Group IV

This picture, then, is one of continuity. The very first issues of Euthydemus I make use of a very similar portrait to the coins of the Diodotoi, whom Polybius tells us Euthydemus overthrew. We would perhaps expect some break in production with the war affecting production. The continuity of production is also notable between the later kings and it is only under Antimachus that the system of production at Mint A and Mint B changes. We have seen that there is very little insight into the political situation in the Graeco-Bactrian kingdom available, and it is therefore impossible to connect changes in the coinage production with particular events. The evidence of continuity between kings may not necessarily reflect a peaceful transition, simply the importance of producing coins quickly at the beginning of a reign. As we saw with the pedigree issues of Antimachus, it was more important to strike coins than to wait for further information about the king's desired types. Likewise, the early coins of Euthydemus were struck with obverse dies cut from the same models as those of his predecessor. Such similarities would also have eased any difficulties in the acceptability of the coins early in the start of a new king's reign. It was clearly important, however, for kings to have a ready supply of coinage at the start of their reign, perhaps when their authority was at its weakest.

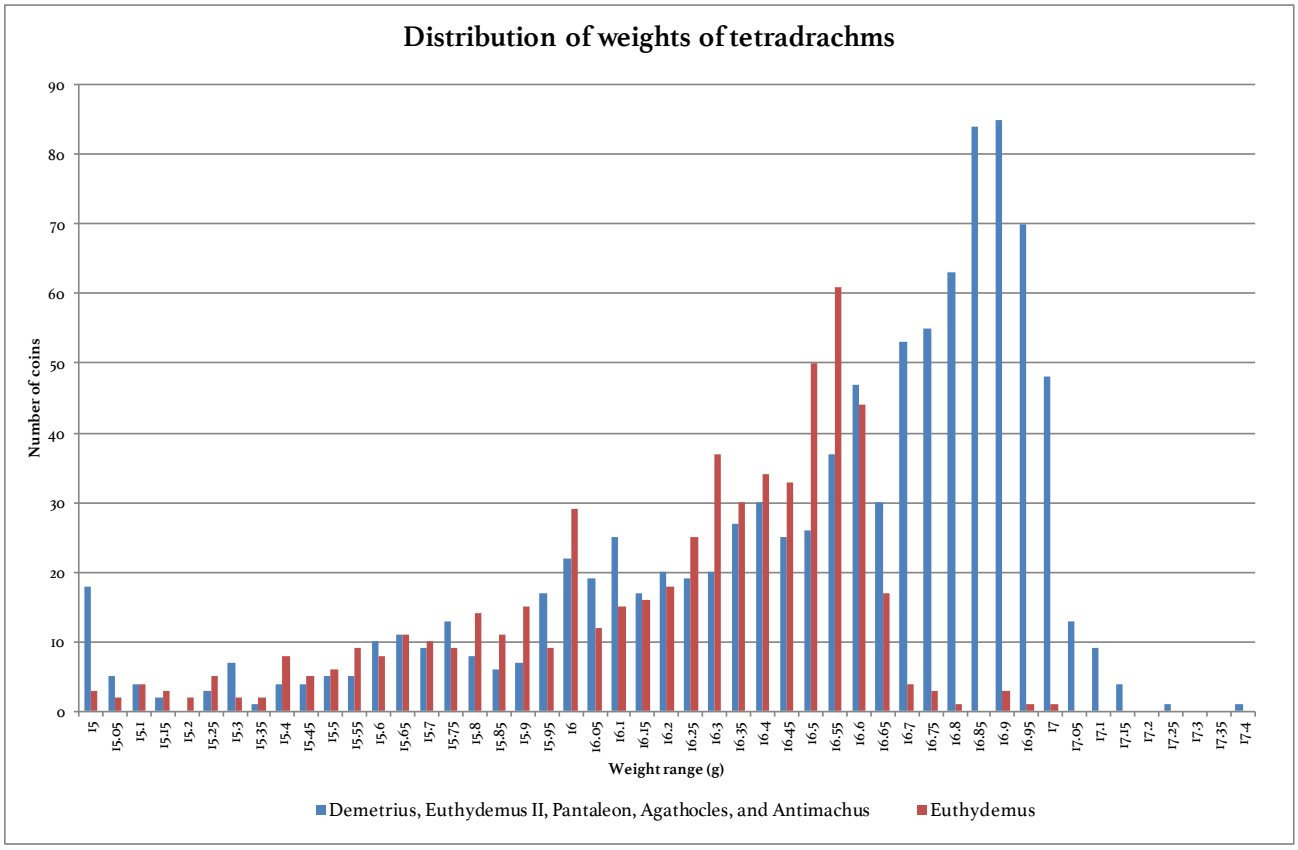
Metrology

For reasons of space, the weights of the coins in the study have been given little consideration, very often being accurately represented by the mean given in the tables of the system of coinage under each king. There is, however, one significant difference in the weights of the tetradrachms, illustrated below.

The chart shows the number of coins that fall within a weight range of 0.05g.[443] As is to be expected for a precious metal coinage the shape of the curve is skewed to the right, with a dramatic decrease in the number of examples after a certain weight. Two sets of data are shown on the chart: weights of Euthydemus I tetradrachms given red bars, those of tetradrachms of the remaining five kings indicated in blue. Although both sets have a similar shape to their curves, the position of the peak differs slightly. For Euthydemus, the peak is at 16.55g to 16.60g, while for the later kings it is 16.90g to 16.95g. This difference is significant because it suggests, whatever the weight loss of the coins, that the mints of

[443] The seemingly large number of coins with weights between 15.00 and 15.05g also includes examples from the study with a weight of less than 15.00g, lending no special significance to the peak at the left hand end of the graph.

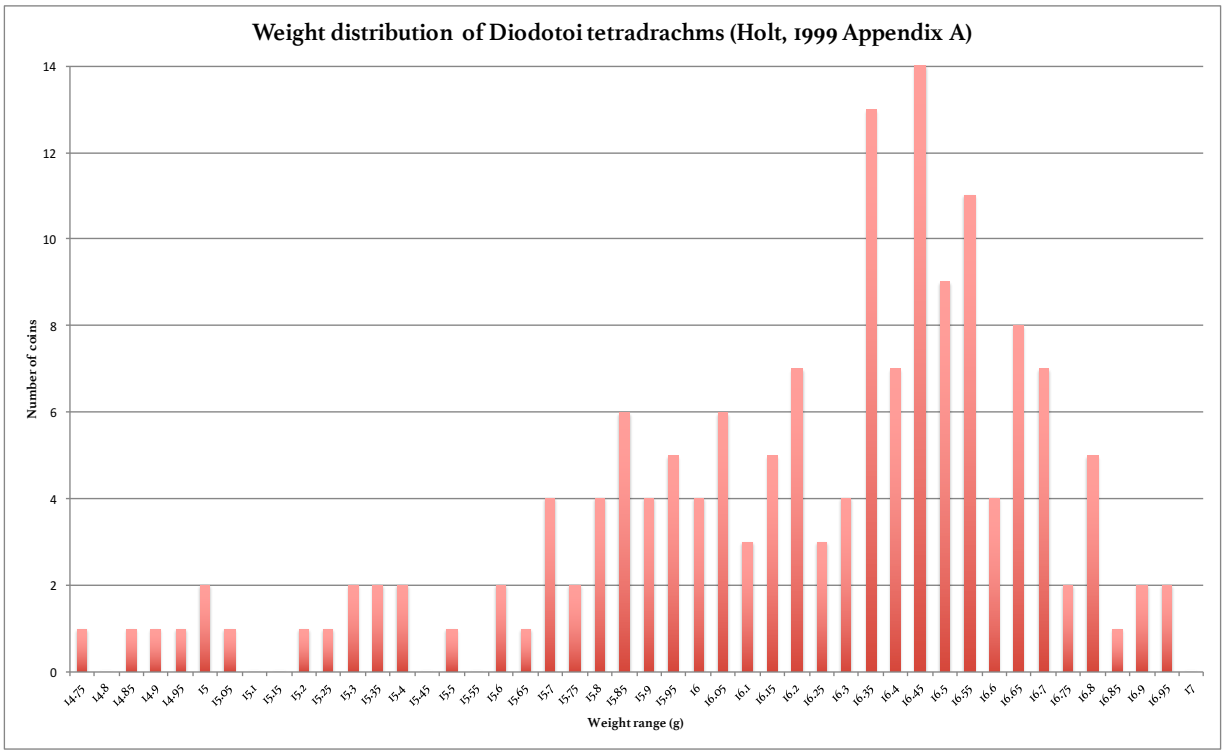
Euthydemus were aiming to produce coins of a slightly lower weight than they were under his successors. A difference (in the weights of the coins as they are now) of 0.3g probably does not constitute a change in weight standard, still falling within the acceptable range for the reduced Attic weight of tetradrachms. What is most confusing is the chronology of this change. Most examples of changes in the weights of coins in the ancient world involve a reduction in the amount of precious metal used in order to strike more coins with the same input. The clearest example from the Hellenistic world being the cistophoric coinage introduced by Eumenes II in the mid 160s.[444] A significant change that was probably due to the loss of silver to Rome through indemnities as well as the Roman capture of mines in Macedonia.[445] There was also a much smaller decrease in weight of tetradrachms produced at Antioch in 173/2, from 17g to 16.5g.[446]



For the Graeco-Bactrian kingdom the shift in weight was by no means as substantial, and involved an increase, something that seems to be an unnecessary increase in the cost of production. Coinage reforms that involved a loss to the issuing authority are exceptionally

[444] Meadows (2013).
[445] Kay (2013).
[446] Houghton (2004), 59.

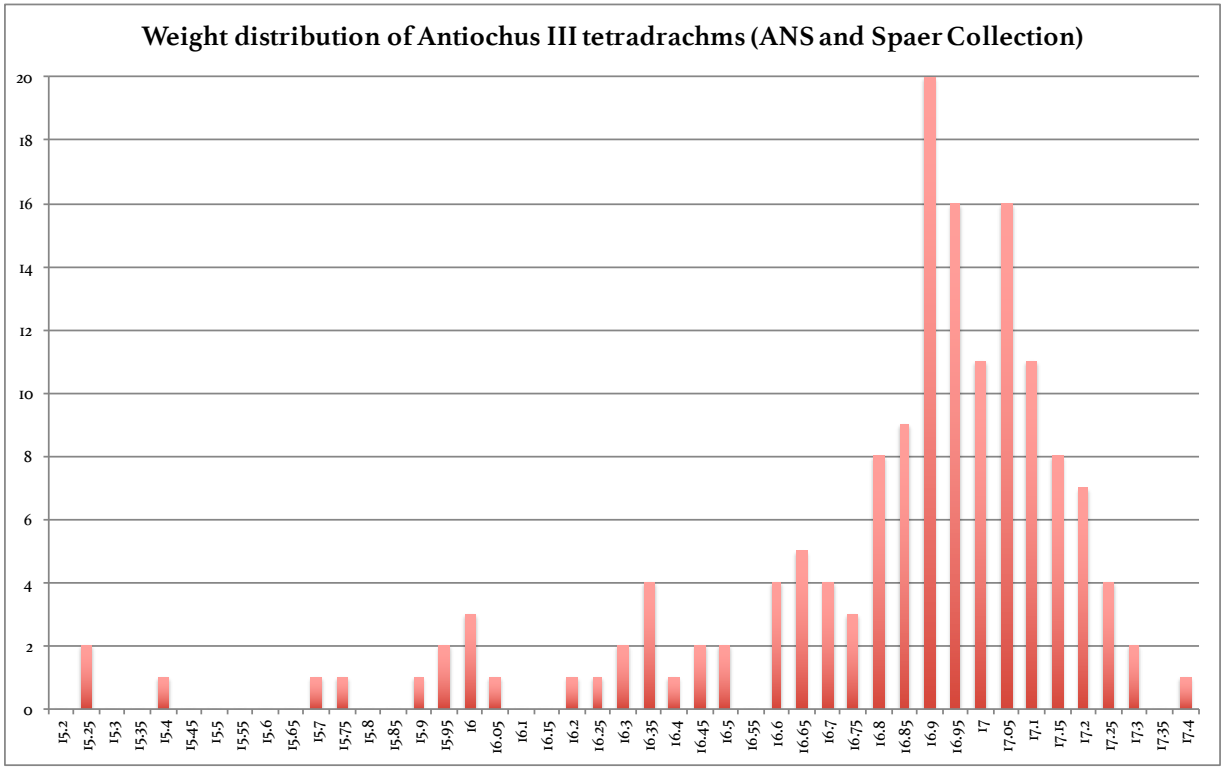
rare in the ancient world, the most famous example being Domitian's increase in the fineness of Roman gold and silver coins in AD 82, a short-lived improvement that has been attributed to a desire to return to higher moral standards.[447] The hoard evidence suggests that the tetradrachms of Euthydemus I were circulating in the kingdom (and probably outside it) without any difficulty, they were even chosen for savings hoards, making up the bulk of the coins in the third Aï Khanum hoard, for example.[448] In fact, using the weights given in Holt's catalogue of tetradrachms of the Diodotoi we find a similar peak as the Euthydemus tetradrachms, around 16.5 g.



A decrease in weight under Euthydemus I can therefore be discounted, since the mints of his predecessors instead aimed to produce coins of a similar weight. The explanation for this change may lie outside the kingdom with the coins produced in the Seleucid empire. Unfortunately, there is currently no full metrological study of the coins of the Seleucids and such a study is beyond the scope of the current work. We have already seen that the weight of tetradrachms at Antioch under Antiochus III seems initially to have been around 17g. Instead I have been able to gather the weights of tetradrachms of Antiochus III in the ANS and Spaer collections. Panagiotis Iossif has recently shown, with regard to

[447] Carradice (1983), 160-162; Duncan-Jones (1994), 221.
[448] Holt (1981).

quantification, that these coins of these two collections (amongst others) can provide results representative of the coinage as a whole.[449] The following chart shows a clear peak in the weight at 16.9g, with a significant number of coins falling within a higher weight range, a finding that fits with the evidence from Antioch.



The apparently higher weight of Antiochus III's tetradrachms provides a probable explanation for the increase in Bactria from Demetrius onwards. With the independence of the Graeco-Bactrian kingdom, the tetradrachms of Diodotus I were initially produced at a slightly lower weight than usual. It is possible that the reduction (approximately three per cent) would not have initially been a concern to the users of the coinage. If it were noticed, it may have led to the retention of silver within the new kingdom, something that would certainly not have been unwelcome for Diodotus. The return to a weight that was equal to the Seleucid tetradrachms may have been a result of the expedition of Antiochus III, which may have led to an influx of his coins. At this point and afterwards, when peace with the Seleucid empire had been secured, it was presumably felt necessary to increase the weight of the Graeco-Bactrian tetradrachms to ensure that they would be accepted and perhaps used in trade outside the kingdom and the weight then remained consistent for the rest of the period covered by this study.

[449] Iossif (2015).

The purpose of coinage

It has long been accepted that a number of Greek coinages were struck as the direct result of warfare, in fact in some cases the legends of the coins make this clear, although the majority of these date from before the Hellenistic period.[450] Howgego has argued that there are plenty of examples of the minting of coins in Antiquity for reasons other than military expenditure or state payments in general.[451] One of Howgego's main examples of 'new coinage without expenditure' is coins struck as the result of a reform, a phenomenon he acknowledges was designed to raise money.[452] It has, however, been pointed out that the majority of cases in which such reforms were under taken can be linked to the need to meet state expenditure, which was almost always military.[453] Indeed there are many examples of large coinages expressly linked to military expenditure. For example, the huge output at Amphipolis between 324 and 323 was the result of the need to pay off Alexander's veterans.[454] Likewise, most of the silver coins of the Achaean League seem to have been produced in two large emissions, both of which are linked to wars: the first against the Aetolian League and Antiochus III, and the second during the Third Macedonian War.[455] The clearest case is the rhythm of production of the coinage of Mithridates VI. The dates given on his coins allow a reconstruction of annual production, which seems to be inextricably linked to the king's military expenditure.[456]

The same seems to have been the case in the Seleucid empire, at least at Seleucia under Antiochus III where the presence of the court and army has been considered to be the major factor in coin production.[457] This is not the whole picture for Antiochus III, however, since many changes in production do not have convenient historical parallels. What does seem certain is the discontinuity of coin production, for whatever reason, perhaps military or political, but just as likely financial. Here the picture is clearer because of our knowledge of the historical context. For example, at Antioch, under Antiochus III, a break in the coinage can be ascribed to a period of five years while the king was campaigning in

[450] Kraay (1984).
[451] Howgego (1990).
[452] Howgego (1990), 15.
[453] Callataÿ (2000), 342-344.
[454] Thompson (1984).
[455] Warren (1999).
[456] Callataÿ (1997). See also Callataÿ (2000), 355-359.
[457] Houghton (2004), 54.

the east.[458] Such gaps exist in the coinage of our kings, but any attempt to explain them in relation to historical events is doomed to failure. It does, however, seem likely that the majority of Graeco-Bactrian tetradrachm production can be assigned, on the basis of Hellenistic comparisons, to military expenditure.

Output comparisons

As well as internal comparisons between the kings whose coins appear in this study, it is also possible to compare outputs with other Graeco-Bactrian and Hellenistic kings. Kovalenko's die study of the coins of the Diodotoi provides a comparison from the period before that covered in this study, while my own studies of the silver coinage of Eucratides I and of Heliocles and Laodice date from the period following.[459]

Table 53: Graeco-Bactrian tetradrachm output (Carter and Esty 2011).

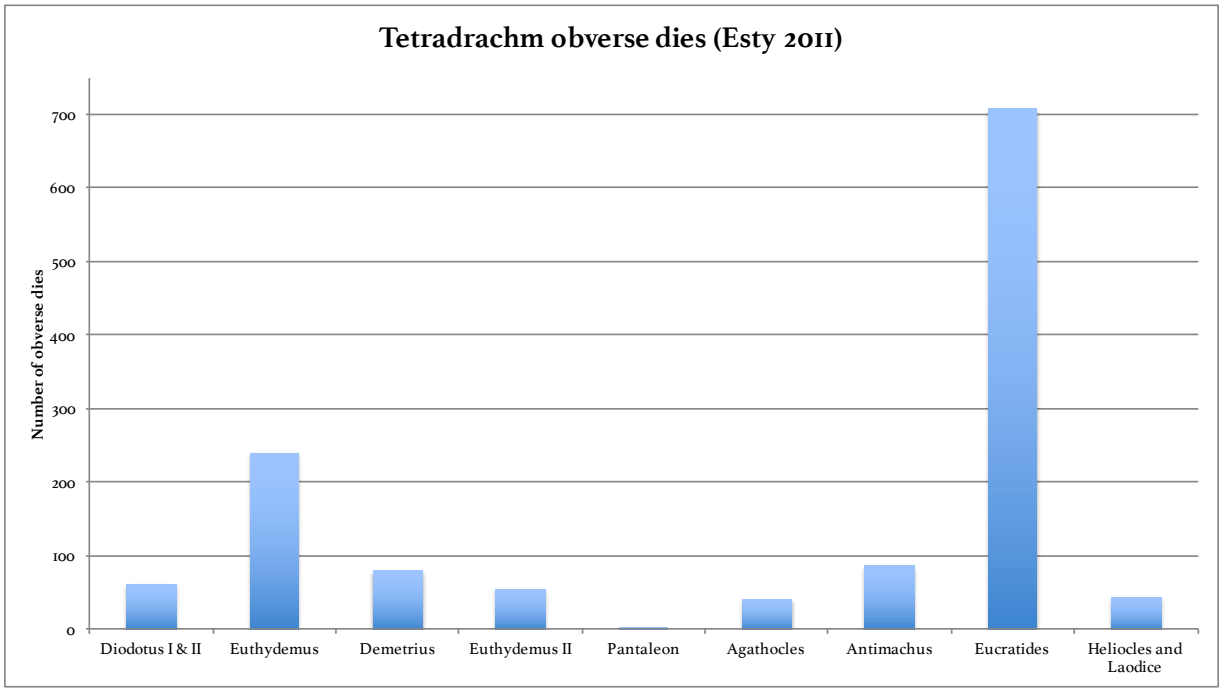
King	Tetradrachm D (Carter)	Tetradrachm D (Esty 2011)
Diodotus I & II	54.6	62.4
Euthydemus I	207.4	240.9
Demetrius I	80.9	80.3
Euthydemus II	52.6	55.4
Pantaleon	2.7	3.3
Agathocles	38.8	42.4
Antimachus I	81	88
Eucratides I	571.7	707.2
Heliocles & Laodice	37.1	45.4

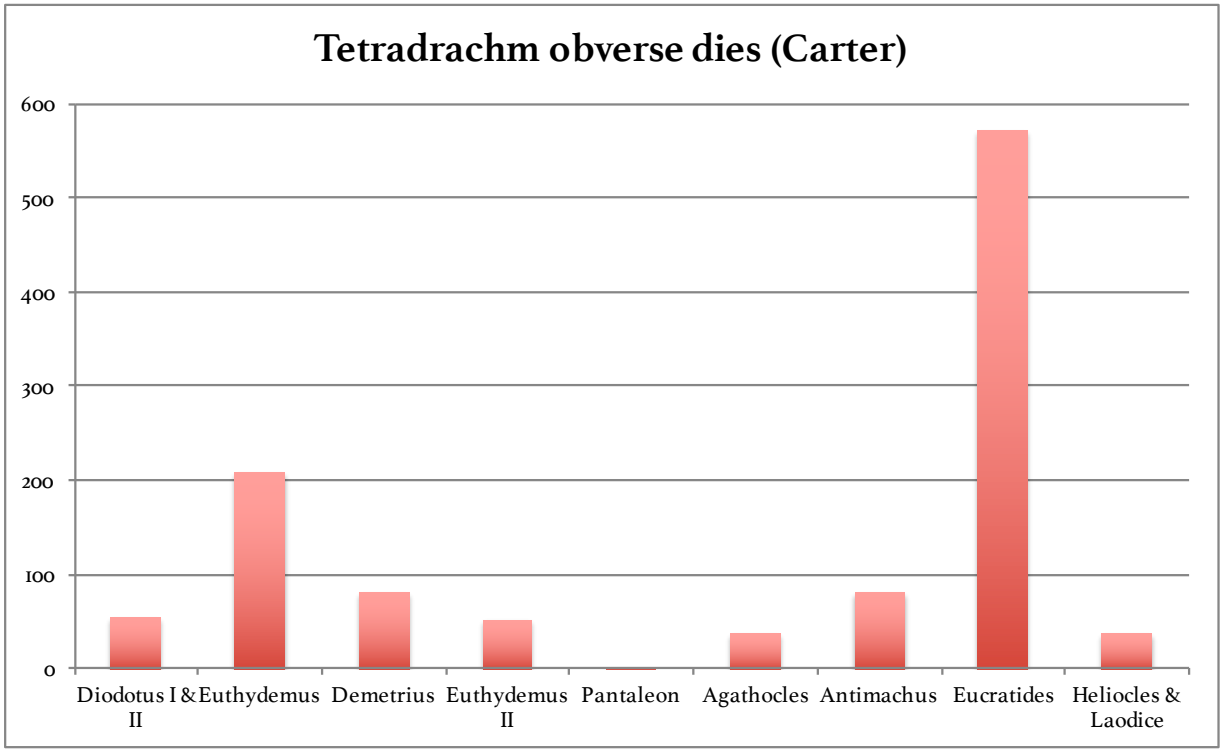
In addition to the comparison of different kings this data affords the opportunity to compare two different methods of estimating the original number of dies. Many published studies use Carter's formula in their estimates. It has therefore been included here to allow easy comparison with other coinages below. Comparing both the table and the charts below we find that both formulae produce proportionally similar results with Esty's formula almost always resulting in a higher figure. For coinages with a small sample, such as the tetradrachms of Pantaleon, with only five coins and two dies in the study, Carter's

[458] Houghton (2004), 53.
[459] Although the latter two studies were completed with limited access to commercial numismatic publications the n/d value for the tetradrachms is high enough to allow a comparison.

formula seems to underestimate, assuming that 0.7 dies are still to be found, while Esty suggests a more reasonable 1.3. At the other end of the scale, for Eucratides, a study which suffers from a low n/d (1.7) at the very limit of the estimates, with 521 coins and 300 obverse dies identified, we find Esty's formula producing very high numbers. Ultimately, however, for the majority of the coinages in the current study, with a representative sample we find that the two methods produce similar results.

The estimates of the different kings' outputs show primarily just how enormous the tetradrachm production of Eucratides was, dwarfing even Euthydemus I's substantial output. The other rulers, with the exception of Pantaleon all used fewer than 100 dies. Interestingly, Euthydemus I and Eucratides are the only two kings whose coins have been the subject of a die study to use substantially different obverse portrait types. We have seen the different models employed under Euthydemus, which change from idealistic to a more naturalistic portrayal of the king. The obverse depiction of Eucratides I also changes. The first series of his coins features a diademed head of the king, while the second series shows the king now wearing a helmet with the addition of the epithet *megas* to the reverse legend. Finally a third series shows the king in novel way, viewed from behind, in the process of throwing a spear. The majority of Graeco-Bactrian kings, however, maintained a single portrait model. Even under Agathocles, whose coins can be divided into chronological series on the basis of the addition of an epithet, the obverse portrait remains consistent in its model, although clearly engraved by a different hand. Such a combination of features may be indicative of a longer reign. Of course a large output of coins by itself does not necessarily indicate that the king ruled for a considerable period, it may simply be the result of the discovery of a new source of silver, or the coining of booty, for example. Here, however, the use of multiple portrait models and depictions (as opposed to different styles of engraving the same image) increases the likelihood that these kings enjoyed longer reigns than their counterparts.


Tetradrachm obverse dies (Esty 2011)
Number of obverse dies
0
100
200
300
400
500
600
700
Diodotus I & II
Euthydemus
Demetrius
Euthydemus II
Pantaleon
Agathocles
Antimachus
Eucratides
Heliocles and Laodice


Tetradrachm obverse dies (Carter)
0
100
200
300
400
500
600
Diodotus I & II
Euthydemus
Demetrius
Euthydemus II
Pantaleon
Agathocles
Antimachus
Eucratides
Heliocles & Laodice

One of the major difficulties with interpreting these results is the lack of other information about the kings. A figure of the yearly number of dies is often calculated in order to facilitate comparison of output. Such a figure cannot be calculated for the Graeco-Bactrian kings, and any attempt would involve working with completely fictional dates. As we have seen, the only absolute date in the study is that of the siege of Bactra in 206. At the one end of the study we do no know when Euthydemus I began to issue coins, and at the other, when Antimachus stopped. Comparisons in terms of absolute numbers of dies are, however, possible. Callataÿ has recently collected a number of estimates of the number of drachm dies (calculated with Carter's formula) used in the production of certain Hellenistic royal coinages.[460] His table is reproduced below with the addition of the results of the coinage of this study as calculated with Carter's formula and adjusted to drachm output.

[460] Callataÿ (2013).

Table 54: Comparison of Hellenistic coinages.

Coinages	Dates	*c.* O (drachm)	*c.* Yearly O (drachm)
Tetradrachms of Alexander	*c.* 332-290	12000	285.7
Tetradrachms of Ptolemy II at Alexandria	285-246	5148	132
Drachms of Alexander	*c.*332-290	3300	78.6
Eucratides I	***c.* 170-*c.* 140?**	**2355**	**n/a**
Ptolemaic tetradrachms at Alexandria	127-97	2280	76
Macedonian silver coins of Philip II	*c.* 359-315	1969	44.7
Tetradrachms of Nikomedes	*c.*128-74	1800	33.3
Tetradrachms of Antiochus III	223-187	1600	44.4
Tetradrachms of Demetrius Poliorcetes	*c.* 306-287	916	48.2
Euthydemus I	-	**864**	**n/a**
Tetradrachms in the name of Philetairos	*c.*280-165	857	7.5
Tetradrachms of Mithridates Eupator	*c.*97-64	768	23.3
Silver coinages of Mausolos	*c.* 377/6-353/2	450	18.8
Tetradrachms of Seleucus IV	187-175	400	33.3
Demetrius I	-	**376**	**n/a**
Antimachus I	-	**340**	**n/a**
Euthydemus II	-	**221**	**n/a**
Diodotus I & II	-	**218**	**n/a**
Agathocles	-	**179**	**n/a**
Heliocles & Laodice	-	**153**	**n/a**
Silver coinages of Idrieus	*c.*351/0-344/3	120	17.1
Silver coinages of Pyrrhos	280-276	64	16
Pantaleon	-	**12**	**n/a**

The result of this comparison is not surprising. With the exception of the coinages of Eucratides I and Euthydemus I the coinages of the remaining kings fall at the lowest end of the scale. The huge output of Eucratides has been discussed elsewhere.[461] The size of Euthydemus I's issues is interesting, using more dies than the entire issue of tetradrachms

[461] Glenn (2011).

in the name of Philetairos. His whole output is, however, only half the size of that of Antiochus III.

We find, then, that most of the Graeco-Bactrian kings produced fewer coins than their counterparts in other Hellenistic kingdoms. We are not, of course, comparing like with like, however. The Seleucid empire covered a much larger area with a many different mint cities producing coins. As we have seen, the normal situation in Bactria seems to have been to use only two mints. In many ways it is better to chose specific mints in the Seleucid Empire for comparison. The table below shows data compiled by Iossif using Le Rider's die study of Antioch as well as Boillet's unpublished study of the mint of Ecbatana.[462] These figures were calculated with Esty's formula.

Table 55: Tetradrachm output at Antioch and Ecbatana.

King	Tetradrachm D Antioch	Tetradrachm D Ecbatana
Seleucus I	10	61
Antiochus I	4	10
Antiochus II	6	3
Seleucus II	28	4
Seleucus III	6	2
Antiochus III	60	52
Seleucus IV	24	5
Antiochus IV	63	9
Antiochus V	22	-
Demetrius I	199	15
Alexander I Balas	69	1
Demetrius II	37	-

After the early period at Ecbatana we find a consistently low output of tetradrachms, with the exception of Antiochus III, a production that should presumably be linked to his military expedition in the region. Output at Antioch is more representative and indicates its status as a major mint of the empire. Comparing with a similar table showing the production at each Graeco-Bactrian mint under each of the kings in the current study provides a pattern much closer to Antioch than to Ecbatana.

[462] Iossif (forthcoming, 2015); Le Rider (1999); Bouillet (2009).

Table 56: Tetradrachm output at Bactrian mints (using Esty 2011).

King	Mint A Tetradrachm D	Mint B Tetradrachm D	Unattributed Tetradrachm D
Euthydemus I	101.8	134.4	-
Demetrius	45.6	41.4	-
Euthydemus II	26.3	29.1	-
Pantaleon	3.3	-	-
Agathocles	24	14.8	5.3
Antimachus	-	21.1	63.2

Concluding remarks

It has been challenging to produce significant conclusions from the results of the die studies. Any attempt must steer clear of the temptation to fall into the construction of a narrative in which comparisons from distant parts of the Hellenistic world are applied to the Graeco-Bactrian kingdom with no certainty that they would apply equally there. It is tempting to take the absolute die numbers calculated for the Bactrian kings and compare them with other Hellenistic studies in an attempt to identify a similar yearly output. Any such attempt would, however, be guesswork. The fact remains that we have almost no information of the context in which these coins were issued. The production of the coins themselves, can, however, be studied in great detail. What seems to emerge is a picture of production at two mints initially, with minting switched to a different location under Antimachus towards the end of the period studied. Under each king there seems to have been an immediate need for new coinage, exemplified by the continuation of the Diodotid portrait model at the start of Euthydemus' reign as well as the short issue of pedigree coins under Antimachus. Here, other Hellenistic comparisons are helpful and it is likely that the main reason for the production of coinage in the Graeco-Bactrian kingdom was a military one.

A coinage history

At the beginning of the period covered by this study, the first coinage of Euthydemus I is very similar to that of the Diodotids. A system of two mints continued, while the initial images of the king that appeared on the coins were probably engraved from the same models that were used for the coins of his predecessors. The output at Mint A was

significant, and is the first time we encounter a feature that reoccurs throughout the study. Often the mints seem to have produced a large proportion of their total output at the start of a king's reign. At some point under Euthydemus the majority of tetradrachm production shifted to a second mint (B), a process that seems to have coincided with a reform to the bronze coinage, which involved the introduction of different production methods and control marks, presumably to ensure accountability on the base metal issues. Unlike later kings, the coins of Euthydemus I make use of different models for the portrait of the king, the last starting a trend for naturalistic images that was continued by his successors. Around the time of the introduction of this new portrait, a gold octodrachm was struck, although for what reason is not known. This was the last time gold was used for coinage in the Graeco-Bactrian kingdom until Eucratides I. Euthydemus I's output was the most substantial of all the kings in this study, even rivalling that of some Hellenistic kings, and dwarfing that of later Graeco-Bactrian kings.

We know no details about the transfer of power from Euthydemus to his son Demetrius, but we may assume it was peaceful, with the evidence of the monograms perhaps suggesting some overlap between the two kings' tetradrachm issues. Mints A and B remained in use under Demetrius, each with a similarly sized output. The most surprising result of the die study of Demetrius' coinage was the very large size of the production of obols, surpassing even the tetradrachm issues. It is difficult to explain the reason for striking so many examples of the smallest silver denomination, but it may be indicative of a lack of those coins in circulation, since they had not made up a major part of production under Demetrius' predecessors.

A major change under Demetrius was the introduction of larger bronze denominations. Although their relative value is not understood these coins were significantly larger than previous Graeco-Bactrian bronzes. Given the large output of silver coins, the base metal issues were presumably not struck to deal with a shortage of precious metal. The production of similarly large coins occurred outside the kingdom, around this time, at Ecbatana, may indicate that they were struck for use outside the kingdom, or as a response to the arrival of the Seleucid denomination.

The final change identified in Demetrius' coinage is the adoption of a very slightly higher weight for the tetradrachm, an increase of perhaps about three per cent. The reason for

such an increase was presumably external, since the change resulted in a financial loss to the issuer. This external influence was again Seleucid, with the tetradrachms produced for Antiochus III weighing around 17g, the same as the increased weight adopted in Bactria.

The picture of Demetrius provided by his coinage is quite different from the very limited information from other sources. He may, indeed, have presided over conquests of land south of the Hindu Kush, but his coinage seems to be focused in another direction, towards the Seleucid empire. In some ways this is not surprising, since the Bactrian kingdom was no longer at war with the Seleucids, and Antiochus III had accepted Demetrius' father as king. Political ties may have grown closer for a time, with the threat of barbarian invasions, an important factor, according to Polybius, in the treaty between Antiochus and Euthydemus. With this change in the political situation the system of coinage under Demetrius was reformed in a way that made it more compatible with that of the Seleucid east.

After Demetrius, with Antimachus the only king attested in a non-numismatic source, we have very little context for the coins. Under Euthydemus II the production of silver coins continued much as it had under Demetrius at Mints A and B, although with an initial rapid production of tetradrachms. Overall Euthydemus II's output was smaller than that of Demetrius. There was one major change in Euthydemus II's system of coinage, with the appearance of coins of a new cupro-nickel alloy. The evidence presented above suggests that these issues should be considered equivalent to other base metal coinages, with their types and the accuracy of their weights indicating that they had no intrinsic value. It is most likely that the alloy was initially mistaken for a simple copper source. This result means much of the current reconstruction of Euthydemus II's reign can be dismissed, with no evidence of an occupation of Taxila or a shortage of silver or any other financial crisis.

We find a similar picture for the next two kings, Pantaleon and Agathocles. Pantaleon's few surviving silver coins leave little scope for analysis, but it seems that only Mint A was used in their production. Under Pantaleon we find the single biggest innovation of the period of the study, the introduction of a bilingual coinage struck to a non-Greek weight standard. These coins feature an iconography clearly different from the usual Greek repertoire, and were produced in a different way, cut from bars rather than cast individually. The location of their production was most likely different from the Attic

standard issues, since these coins do not include monograms. Unfortunately, however, without secure find spots we do not know where this location was, and links to Taxila, on the basis of coins with similar types found there are no longer tenable. It is clear, however, that under Pantaleon, and also Agathocles who produced very similar coins, there was a deliberate decision to strike coins that were intended for a different group of users than the silver coins. These users were assumed to have a knowledge of Brahmi, to be familiar with a different iconography, and to expect coins that were square. Whether these bilingual coins are evidence of a conquest in India, or simply of a desire to trade with the area is uncertain. As bronze coins, with no intrinsic value, it is most likely that they were produced to circulate in an area in which the issuer had sufficient authority to guarantee their acceptance as currency and that they are therefore evidence of an initial Indo-Greek coinage.

The coinage of Agathocles is remarkably similar to that of Pantaleon and it must be assumed that the two were very close chronologically, although not necessarily that they were related. Many of Pantaleon's types were adopted without modification under Agathocles, although in some cases minor changes were made. While the reverse deities of the silver coinage remained Zeus and Hecate, the father of the gods was shown standing on Agathocles' coins, instead of seated on a throne as he had been on Pantaleon's issues. Overall Agathocles' silver output seems to have been smaller than that of his predecessors (with the exception of the anomaly of Pantaleon). The main innovation under Agathocles was the appearance of the 'pedigree' tetradrachms which used the types of previous kings, with Agathocles only identified in an unusual form of legend on the reverse. The die study has shown that these coins were not produced at the beginning of Agathocles' reign, a very important point to be taken into account when considering the reason for their introduction, and one that negates a number of previous theories. The deified nature of the kings whose types are used perhaps suggests that the series had some sort of religious connection, but without further evidence such hypotheses cannot be confirmed.

The production of bilingual coinage continued under Agathocles with the same types as used by Pantaleon for the bronze coinage. A small series of silver issues also exists, however, and is one of the very few for which we have a secure find spot, the coins having been unearthed during the excavation at Aï Khanum. This coins retain a Greek legend, while also using Brahmi and an entirely non-Greek iconography. The context of this find,

they were discovered with over six hundred Indian punch-marked coins, is important, and suggests that they were not intended for circulation in Bactria. They are therefore further evidence of a Graeco-Bactrian presence south of the Hindu Kush.

The coins of the final king in the study, Antimachus I, mark a departure from the usual system of production of coins at Mints A and B. Mint B certainly continued in use and there is evidence of a second mint, but whether this was the same as Mint A is not clear. A fortuitous die link with a progressive flaw is a dramatic example of the potential of the die study. The link concerned, between Diodotus Soter 'pedigree' coins of Agathocles and Antimachus confirms the previously uncertain chronological order of the two kings. Following Antimachus' rise to power one mint struck coins for him, before detailed orders of the desired types had been received. This was possible because of the unusual format adopted under Agathocles in which the portrait of the current king did not appear, only his name in the legend. The mint began to strike coins using a die that had developed a flaw when striking Agathocles' coins and had been presumably put to one side. With a desire to produce coins quickly this die was partially recut in order to ensure the legend was legible, but not significantly enough to remove the die break. After this only three or four more obverse dies were devoted to the production of 'pedigree' coins, before striking (perhaps at a different location) switched to the now famous portrait of Antimachus wearing the *kausia*. It is clear from the study that Antimachus' 'pedigree' issues were only a very small part of his coinage, and the use of the types of previous kings was probably out of necessity rather than any considered iconographic programme as it had been under Agathocles.

Unlike the previous three kings the portrait of Antimachus appears with a number of varying styles, although a single model was probably used. This feature of his coins, alongside the larger silver output, may indicate a longer reign for Antimachus than his immediate predecessors. The non-Greek, rectangular coins produced under this king remain something of a puzzle. Unlike Pantaleon's and Agathocles' non-Greek coins these issues are monolingual, with only Greek appearing. They also use types (an elephant and a thunderbolt) that are not exclusively non-Greek in interpretation. Unfortunately, with very few examples and no find evidence, these coins remain a mystery, but it does seem likely that under Antimachus there was no determined effort, as had been the case for

Pantaleon and Agathocles, to cater for non-Greek users of his coins, a conclusion that may have implications for the extent of his kingdom.

The stated aim at the beginning of this study was to produce a more soundly based reconstruction of Graeco-Bactrian history. Although of much more limited scope than previous attempts the above summary shows that a narrative can be constructed from the available evidence. It is hoped that this study can be used as the basis for future investigations of Graeco-Bactrian coinage, much in the same way that the studies of Kovalenko, Holt, and Kritt provided a starting point with their reconstructions of the coinage systems of the Diodotids. Much of the result of this work has been the destruction of previous narratives. A thorough numismatic examination of the pedigree coins, for example, has negated previous historical narratives of the kings under whom they were issued. New historical reconstructions should be tested against the evidence presented here and in this way our understanding of the Graeco-Bactrian kingdom can be furthered in a sustainable way.

Appendix A: Die Catalogues

Notes for catalogue use

A unique number was assigned to each coin as they were added to the study. Obverse and reverse die numbers are numbered similarly, with no implication of a chronological or relative order of minting. Both sets of numbers may not be consecutive where coins have been identified as duplicates and removed from the study. Unless otherwise specified the die axis of each group is 12 o'clock.

Euthydemus I

AU Staters

Obv. Diademed head of king facing right. Dotted border.
Rev. Heracles seated on rock, holding club, resting on separate pile of rocks, in right hand.
ΒΑΣΙΛΕΩΣ ΕΥΘΥΔΗΜΟΥ.
Die axis: six o'clock

Mint B

Group I (B1) 𐤌

O2 R6
Zeng 2013 die linked to Antiochus stater (Künker 226, 11th March 2013, 619; CNG 84, 5th May 2010, 783)
C6 Künker, Auction 216 8th October 2012, 546; Gorny, Auction 96 7th June 1999, 267; 8.15;
C7 CNG, Triton XIII 5th January 2010, 251; 8.25.
C10 CNG, Triton VIII 11th January 2005, 621; 8.29;
C11 Ira & Larry Goldberg, Auction 72 5th February 2013, 4100; Berk, 90, 17th April 1996, 9; 8.14

O3 R5
C5 *BNBact*, 2; 8.25
C17 BM, 1867.0506.12; *BMC* 1; 8.37

Group II (B4, B5) 𐤍

O1 R1
C1 BM, 1888.1208.72; 8.24
C8 CNG, MBS 70 21st September 2005, 456; CNG, Triton VIII 11th January 2005, 622; 8.15

O1 R3
C3 Ashmolean, Hollis Collection; RC Senior Ltd, Undated List, A; 8.25

O1 R4
C4 *BNBact*, 1; 8.17

O4 R2
C2 BM, 1888.1208.73; 8.22
C9 CNG, MBS 69 8th June 2005, 795; 8.09
C12 Jacob Hirsch, Auction 21 16 November 1908, 4411; 8.29

C14 C.& E. Canessa, Auction 28th June 1923, 85; 8.68

O4 R7

C13 Bank Leu AG Zürich, Auction 20 25/26 April 1978, 170; 8.26

Group III (B11)

O5 R8

C15 Gorny, Auction 156 5th March 2007, 163; Roma Numismatics Ltd, Auction 2 2nd October 2011, 367; Ira & Larry Goldberg, Auction 69 29th May 2012, 3201; 8.46

C16 Kritt (2015), Commerce 2000, 14; n/a

Method	D_o	±	D_r	D_r/D_o	W
Carter	6.1	0.9	12.3	2	0.55
Good	5		9.7	1.9	
Esty,1986	5		11.5	2.3	
Esty, 2011	7.1	3.1	15.1	2.1	0.57

AU Octodrachm

Obv. Diademed head of king facing right. Dotted border.
Rev. Heracles seated on rock, holding club, resting on thigh, in right hand. ΒΑΣΙΛΕΩΣ ΕΥΘΥΔΗΜΟΥ.
Die axis: twelve o'clock

Mint A

O1 R1

C1 *BNBact* 15; 32.73

AR Tetradrachms

Mint A

A Group I (A1-A10)  ,  , + TI, +AN, + A, +N

Obv. Diademed head of king facing right. Dotted border.
Rev. Heracles seated on rock, holding club, resting on separate pile of rocks, in right hand. ΒΑΣΙΛΕΩΣ ΕΥΘΥΔΗΜΟΥ.
Die axis: six o'clock

O2 R2
C2 BM, 1888.1208.74; 16.41
O2 R75
C79 *SNG* Copenhagen, 252; 16.31
O2 R131
C145 CNG, Electronic Auction 223 2nd December 2009, 259; 16.60
O2 R185
C211 Gorny & Mosch, Auction 142 10th October 2005, 1711; 16.26
O7 R7
C7 BM, 1853.0713.9; 16.62
O7 R52
C53 Qunduz Hoard, 11; 15.95
O7 R84
C90 Colin E. Pitchfork Collection, 89; Sotheby & Co. Zürich, Auction 27/28 October 1993, 910; CNG, MBS 60 22nd May 2002, 1100; 16.46
C320 CNG, MBS 58 19th September 2001, 848; 16.47
O7 R90
C97 Stack's Bowers and Ponterio, Auction 168 ANA Auction 8th August 2012, 20468; 16.43
O7 R238
C291 CNG, Electronic Auction 64 7th May 2003, 199; CNG, MBS 35 20 September 1995, 437; 16.21
O7 R281
C354 Fitzwilliam Museum, Tremlett Bequest 1918; n/a
O7 R396
C569 Aureo, Auction 16 December 1998, 2039; 15.99
O12 R12
C12 BM, 1938.1212.2; 15.51
O12 R15
C16 BM, 1993.1106.18; 15.10
O12 R245
C300 Gorny & Mosch, Auction 122 10th March 2003, 1541; 16.40
O12 R296
C377 Gorny, Auction 97 11th October 1999, 602; 16.28
O19 R23
C24 Ashmolean, H. De S. Shortt Bequest 1975; 16.30

O24 R28
C29 Ashmolean, Hollis Collection; 14.99
O33 R39
C40 *BNBact*, 9; 16.27
O33 R51
C52 Qunduz Hoard, 10; 16.30
O33 R63
C66 *SNG* ANS, 125; 16.24
O33 R93
C100 Gerhard Hirsch Nachf., Auction 281 2nd May 2012, 487; Hirsch, Auction 272 4th May 2011, 389; Hirsch, Auction 269 23rd September 2010, 2609; Hirsch, Auction 266 11th February 2010, 1837; Hirsch, Auction 263 24th September 2009, 2503; Hirsch, Auction 260 12th February 2009, 1841; Gorny & Mosch, Auction 134 11th October 2004, 1664; 16.48
O33 R157
C178 CNG, Electronic Auction 170 8th August 2007, 138; 16.38
O33 R165
C186 Gorny & Mosch, Auction 156 5th March 2007, 1564; 15.83
O33 R189
C215 Spink, Auction 5014 28th September 2005, 204; 16.29
O33 R199
C533 Munthandel G. Henzen, List 183 November 2007, 296; 16.19
O33 R200
C232 Gorny & Mosch, Auction 134 11th October 2004, 1662; 16.10
O33 R202
C589 Sotheby & Co., Haughton Collection 1st May 1958, 286; 15.96
O33 R223
C267 CNG, Electronic Auction 84 3rd March 2004, 91; 16.57
O33 R251
C310 Dr. Busso Peus Nachf., Auction 372 30th October 2002, 748; 16.46
O33 R392
C560 Aï Khanum II 1973, 36; 15.59
O34 R40
C41 *BNBact*, 10; 16.13
C489 Kovacs, MBS XIII 3 June 1998, 98; 16.75
O34 R111
C121 Gorny & Mosch, Auction 196 7th March 2011, 1939; Berliner Münz-Cabinet, Auction 13, 21/22 May 1981, 97; Holt 1981, 36; 15.86
O34 R153
C171 Heritage, New York Signature Sale 458 6th January 2008, 50035; 15.86
O34 R179
C202 CNG, Electronic Auction 133 15th February 2006, 109; 16.46
O34 R256
C318 Dr. Busso Peus Nachf., Auction 371 24th April 2002, 299; Numismatik Lanz München, Auction 102 28th May 2001, 338; 16.15
O34 R258
C323 CNG, MBS 58 19th September 2001, 850; 16.37

O34 R297

C378 Gorny, Auction 101 6th March 2000, 468; 16.28

O34 R398

C573 Alpha Bank Numismatic Collection, 10131; 15.54

O39 R46

C47 Bibliothèque Royale de Belgique, Coll. De Hirsch; 16.49

C65 *SNG* ANS, 124; 16.32

O39 R135

C149 Spink, Auction 9026 1st October 2009, 883; Spink, Auction 3014 8th October 2003, 129; 16.48

O42 R55

C56 Qunduz Hoard, 14; 16.25

O45 R65

C68 *SNG* ANS, 127; 15.46

O45 R88

C95 Roma Numismatics Ltd, Auction 4 30 September 2012, 1958; Spartan Numismatics, BBS 44 20 March 2007, 123; 15.75

O45 R106

C114 Jean Elsen, Auction 109 18th June 2011, 262; Jean Elsen, Auction 108 12th March 2011, 243; Spink, Auction 6018 26th September 2006, 751; Berk, BBS 89, 14 February 1996, 197; Dix Noonan Webb, Coinex Auction 27th September 2007, 2287; 16.61

C352 Jean Elsen, Vente Publique 61 18th-19th March 2000, 207; 15.35

O45 R172

C195 Spink, Auction 6018 26th September 2006, 753; 15.70

C623 Holt 1981, 39; n/a

O45 R204

C236 Gorny & Mosch, Auction 134 11th October 2004, 1660; 16.44

O45 R206

C626 Holt 1981, 42; n/a

O45 R259

C324 CNG, MBS 58 19th September 2001, 846; 16.42

C349 Baldwin, Auction 26 9th May 2001, 1792; Baldwin, Auction 31 14th/15th October 2002, 65; 16.17

C497 Fred B. Shore, FPL 98 October 2001, 25; 16.45

O45 R272

C340 Numismatik Lanz München, Auction 97 22nd May 2000, 359; 16.38

C625 Holt 1981, 41; n/a

O45 R327

C431 Berliner Münz-Cabinet, Auction 13, 21/22 May 1981, 98; Berliner Münz-Cabinet, Auction 14, 16/17 November 1981, 46; 16.09

O45 R336

C443 Dr. Busso Peus Nachf., Auction 288 30 September 1975, 330; 16.14

O45 R366

C507 Spartan Numismatics, BBS 52 May 2010, 155; n/a

O45 R413

C622 Holt 1981, 38; n/a

O47 R68

C71 *SNG* ANS, 130; 15.66

O63 R94
C101 Comptoir Général Financier, Auction 19th April 2012, 140; 16.22
O79 R126
C139 Stack, Auction 28th April 2010, 190; 15.62
O79 R377
C532 Munthandel G. Henzen, List 170 August 2006, 257; Gerhard Hirsch Nachf., Auction 289 2 May 2013, 476; 16.28
O81 R128
C141 Stack, Auction 28th April 2010, 188; 15.62
O81 R132
C146 CNG, Electronic Auction 222 11th November 2009, 223; 14.92
O81 R253
C312 Künker, Auction 77 30th September 2002, 273; Argenor Numismatique, Auction 25th April 2002, 121; Dr. Busso Peus Nachf., Auction 337 3-9 November 1993, 248; 16.46
O81 R405
C600 Kirk Davis, BBS 36 Fall 2001, 77; 15.00
O89 R145
C162 CNG, Electronic Auction 190 25th June 2008, 147; HD Rauch, MBS 9 23rd Sep 2005, 265; 16.12
O91 R150
C168 Comptoir Général Financier, MBS 34 30th April 2008, 300; 16.49
O91 R169
C190 CNG, Electronic Auction 158 14th February 2007, 64; 16.48
O91 R206
C238 Gorny & Mosch, Auction 134 11th October 2004, 1667; 16.56
O94 R135
C604 German Private Collection, 1; 16.9
O94 R168
C189 Gorny & Mosch, Auction 156 5th March 2007, 1563; Athena, Lagerliste 20, 111; 16.63
O94 R445
C531 Todywalla's Auctions, 7 17 April 2004, 19; 16.50
O97 R174
C197 CNG, MBS 72 14th June 2006, 1019; 16.59
O97 R278
C346 Gemini LLC, Auction IX 9th January 2012, 681; Pegasi, MBS XXV 8 November 2011, 231; Millies Collection Utrecht, 26 June 1873, 1065; 15.57
O98 R180
C203 CNG, Electronic Auction 131 18th January 2006, 107; 15.87
O98 R334
C441 Otto Helbing Nachf., Auction 24 October 1927, 3151; Pegasi, BBS 140 2 August 2011, 154; 16.20
O107 R131
C225 CNG, Electronic Auction 107 2nd February 2005, 123; 16.61
O107 R238
C483 CNG, MBS 51 15 September 1999, 691; 15.76
O110 R63
C471 CNG, MBS 38 6/7 June 1996, 484; 16.36

O110 R93

C332 Dr. Busso Peus Nachf., Auction 368 25th April 2001, 406; Dr. Busso Peus Nachf., Auction 366 29th October 2000, 288; 16.99

O110 R199

C231 Gorny & Mosch, Auction 134 11th October 2004, 1665; Gorny & Mosch, Auction 130 8th March 2004, 1668; 16.28

O110 R202

C234 Gorny & Mosch, Auction 134 11th October 2004, 1666; Münz Zentrum Rhineland, Auction 135 10-12 January 2007, 141; 16.42

C275 Gorny & Mosch, Auction 126 14th October 2003, 1501; 16.58

C514 Münz Zentrum, Auction 39 16 April 1980, 727; 15.28

O110 R207

C239 Gorny & Mosch, Auction 134 11th October 2004, 1661; 16.04

O110 R217

C257 Gorny & Mosch, Auction 130 8th March 2004, 1667; 16.53

O110 R229

C276 Gorny & Mosch, Auction 126 14th October 2003, 1502; 16.45

O110 R350

C474 CNG, MBS 45 18 March 1998, 750; 16.37

O111 R203

C235 Gorny & Mosch, Auction 134 11th October 2004, 1663; 16.52

O112 R210

C246 CNG, MBS 66 19th May 2004, 943; 16.52

O112 R277

C345 Gemini LLC, Auction IX 9th January 2012, 680; George Bauer, Auction (George A. Gillette), 7 December 1940, 247; 16.19

O112 R359

C495 Dmitry Markov, MBS 7 29/30 September 1999, 106; 16.28

O112 R366

C624 Holt 1981, 40; n/a

O112 R390

C621 Holt 1981, 37; n/a

O113 R213

C251 Gorny & Mosch, Auction 130 8th March 2004, 1669; 16.53

C296 Gorny & Mosch, Auction 122 10th March 2003, 1540; 16.66

O113 R227

C273 CNG, Electronic Auction 78 26th November 2003, 61; 16.34

O113 R374

C523 Dr. Busso Peus Nachf., Auction 314 30 October 1985, 281; Holt 1981, 46; 16.28

O115 R450

C269 CNG, Electronic Auction 83 18th February 2004, 76; 16.15

O120 R233

C285 CNG, MBS 63 21st May 2003, 923; 16.70

O120 R244

C299 Gorny & Mosch, Auction 122 10th March 2003, 1544; 16.46

O120 R273

C341 Numismatik Lanz München, Auction 97 22nd May 2000, 360; Jean Elsen, Vente Publique 67 15th September 2001, 312; Jean Elsen, Vente Publique 50 14th June 1997, 344; Lanz München, Auction 64 7 June 1993, 330; 16.55

O123 R239

C293 Gorny & Mosch, Auction 122 10th March 2003, 232; 16.53

O124 R240

C294 Gorny & Mosch, Auction 122 10th March 2003, 1546; 16.43

O124 R298

C379 Gorny, Auction 101 6th March 2000, 469; 16.09

O126 R153

C451 Münzen Auktion Essen, Auction 80 12/13 September 2000, 135; 16.42

O126 R247

C304 Gorny & Mosch, Auction 122 10th March 2003, 1542; Stephen Album Rare Coins, Auction 14 21st September 2012, 1018; 15.94

O126 R337

C445 Münzen Auktion Essen, Auction 65 26-28 May 1993, 268; 16.49

O126 R369

C511 World Numismatic Auctions, 1 1 December 2007, 447; 16.38

O126 R389

C557 Aï Khanum II 1973, 33; 15.34

O131 R260

C325 CNG, MBS 58 19th September 2001, 849; 16.47

O131 R262

C327 CNG, MBS 58 19th September 2001, 847; 15.70

C479 CNG, MBS 49 17 March 1999, 835; 16.24

O131 R269

C337 CNG, MBS 57 4th April 2001, 710; 16.56

C381 Gorny, Auction 101 6th March 2000, 471; 15.77

O131 R442

C667 Sotiriadis Collection, (Svoronos 1913, pl. XVIII), 3; 15.88

O142 R310

C408 Gerhard Hirsch, Auction 233 12-14 February 2004, 1557; 16.24

O164 R273

C502 Pegasi, MBS XX 21 April 2009, 239; 15.52

O166 R371

C515 Münz Zentrum, Auction 46 21 April 1982, 179; 15.40

C631 Holt 1981, 49; n/a

O166 R414

C627 Holt 1981, 43; n/a

C628 Holt 1981, 44; n/a

C629 Holt 1981, 45; n/a

O172 R388

C556 Aï Khanum II 1973, 32; 16.05

O173 R390

C558 Aï Khanum II 1973, 34; 16.43

O173 R391
C559 Aï Khanum II 1973, 35; 15.53
O174 R150
C611 German Private Collection, 9; 16.5
O174 R393
C561 Aï Khanum II 1973, 37; 15.60

A Group II (A11-A14)  ,  N,  A

Obv. As above.
Rev. As above.

O8 R8
C8 BM, 1856.1105.2; 16.50
O8 R64
C67 *SNG* ANS, 126; 15.82
O8 R173
C196 CNG, Electronic Auction 143 12th July 2006, 101; 16.53
O8 R195
C223 Gorny & Mosch, Auction 138 7th March 2005, 1565; Gorny & Mosch, Auction 134 11th October 2004, 1669; 16.18
C241 Künker, Auction 94 27th September 2004, 1522; Jean Elsen, Vente Publique 49 19th April 1997, 384; Gorny, Auction 71 3rd May 1995, 460; Gorny, Auction 89 5th May 1998, 289; The New York Sale, II 2 December 1999, 131; 16.48
C412 P.-F. Jacquier, FPL 16 Autumn 1994, 243; P.-F. Jacquier, FPL 17 Autumn 1995, 194; 16.08
C491 Kovacs, MBS XV 1 October 2003, 173; 15.45
O8 R299
C382 Gorny, Auction 101 6th March 2000, 472; CNG, MBS 46 24 June 1998, 609; 16.60
O8 R311
C413 P.-F. Jacquier, FPL 32 Summer 2004, 188; 16.57
O9 R9
C9 BM, India Office Collection 1; 15.82
O9 R162
C605 German Private Collection, 2; 16.4
O26 R30
C31 Ashmolean, Hollis Collection; 15.47
O26 R53
C54 Qunduz Hoard, 12; 15.47
O26 R54
C55 Qunduz Hoard, 13; 16.31
O26 R67
C70 *SNG* ANS, 129; 16.51
O26 R158
C179 CNG, MBS 75 23rd May 2007, 615; 16.42
O26 R282
C355 Fitzwilliam Museum, McClean Bequest, 9685; 15.18

O26 R372
C521 Dr. Busso Peus Nachf., Auction 313 13 May 1985, 304; 15.64
O35 R41
C42 *BNBact*, 11;15.97
C137 Comptoir Général Financier, MBS 43 29th April 2010, 284; 16.46
O35 R42
C43 *BNBact*, 12; 15.84
O35 R241
C295 Gorny & Mosch, Auction 122 10th March 2003, 1543; 16.39
O35 R394
C562 Aï Khanum II 1973, 38; 15.67
O46 R66
C69 *SNG* ANS, 128; Collection V. Luneau, 26th March 1922, 832; 16.61
O46 R162
C436 Adolph E. Cahn, Auction 60 2 July 1928, 1187; 16.35
O46 R372
C563 Aï Khanum II 1973, 39; 15.21
O48 R69
C72 *SNG* ANS, 131; 15.86
O48 R303
C391 Dr Jacob Hirsch, Auction 6th May 1912, 502; 16.00
O49 R448
C73 *SNG* ANS, 132; 16.64
O54 R41
C193 Gorny & Mosch, Auction 151 9th October 2006, 233; 16.39
O54 R42
C350 HD Rauch, Auction 61 25th May 1998, 93; 15.91
C380 Gorny, Auction 101 6th March 2000, 470; 16.06
O54 R78
C83 *SNG* Milan, 1; Leo Hamburger, 12th June 1930, 475; 15.98
O54 R120
C130 Hess-Divo AG, Auction 317 27th October 2010, 315; 16.06
O54 R216
C256 Gorny & Mosch, Auction 130 8th March 2004, 1670; Munthandel G. Henzen, List 199 January 2009, 302; 16.50
O54 R323
C444 Münzen Auktion Essen, Auction 65 26-28 May 1993, 267; 16.45
O61 R69
C230 Gorny & Mosch, Auction 134 11th October 2004, 1668; 16.01
O61 R91
C98 CNG, Auction 90 23rd May 2012, 863; 16.55
O61 R107
C115 CNG, Auction 255 4th May 2011, 148; 15.98
O61 R156
C177 Jean Elsen, Auction 93 15th Sep 2007, 536; Gorny, Auction 73 11th Oct 1995, 230; 16.34

O61 R403

C588 Sotheby & Co., Haughton Collection 1st May 1958, 285; 15.45

O62 R92

C99 Gerhard Hirsch Nachf., Auction 281 2nd May 2012, 488; M&M Numismatics, New York Sale XXVIII 5th January 2012, 1049; Gorny & Mosch, Auction 122 10th March 2003, 1545; Gerhard Hirsch Nachf., Auction 287 7th February 2013, 2080; 16.45

C264 Gorny & Mosch, Auction 130 8th March 2004, 1675; 16.24

O62 R109

C118 CNG, Electronic Auction 252 23rd March 2011, 196; 16.41

O62 R149

C167 CNG, Electronic Auction 187 30th April 2008, 71; 15.64

O62 R152

C170 Stack, Auction 14th January 2008, 2318; Gemini LLC, Auction IX 9th January 2012, 218; 16.42

O62 R162

C183 CNG, Electronic Auction 162 11th April 2007, 128; 15.88

O62 R354

C480 CNG, MBS 49 17 March 1999, 836; 16.20

C606 German Private Collection, 3; 15.3

O73 R54

C220 CNG, Electronic Auction 122 7th September 2005, 169; 16.47

C333 CNG, MBS 57 4th April 2001, 711; 16.43

O73 R113

C123 CNG, Triton XIV 4th January 2011, 420; 16.57

O73 R122

C133 CNG, Auction 85 15th September 2010, 553; Helios Nuismatik, Auction 1 17th April 2008, 178; Freeman & Sear, MBS 14 21st June 2007, 283; 16.60

O73 R313

C415 H H Kricheldorf Nachf., Auction 24/25 September 1987, 51; 16.35

O85 R136

C150 Spink, Auction 9026 1st October 2009, 884; Spink, Auction 3014 8th October 2003, 130; 15.86

C243 CNG, Electronic Auction 97 8th September 2004, 78; 16.95

C468 CNG, MBS 33 15 March 1995, 462; CNG, (Triton 1) 2/3 December 1997, 608; 16.58

O85 R416

C634 Holt 1981, 52; n/a

O86 R137

C151 HD Rauch, Summer Auction 17th September 2009, 391; Gorny & Mosch, Auction 134 11th October 2004, 1672; Gorny & Mosch, Auction 130 8th March 2004, 1672; 15.75

O86 R309

C405 Gerhard Hirsch, Auction 206 24-26 November 1999, 276; 15.07

O86 R357

C484 CNG, MBS 51 15 September 1999, 693; Kovacs, MBS XV 1 October 2003, 174; 16.50

C632 Holt 1981, 50; n/a

O88 R142

C158 Comptoir Général Financier, MBS 36 23rd October 2008, 241; Gorny & Mosch, Auction 134 11th October 2004, 1670; 16.39

C319 CNG, MBS 58 19th September 2001, 852; 15.80

O88 R160

C181 CNG, MBS 75 23rd May 2007, 616; 16.38

O88 R219

C261 Gorny & Mosch, Auction 130 8th March 2004, 1671; Pegasi, MBS XI 19 October 2004, 237; Pegasi, MBS XIX 18 November 2008, 186; Spartan Numismatics, BBS 36 1 March 2005, 150; 16.44

O88 R304

C393 Gerhard Hirsch, Auction 16th-19th April 1958, 130; n/a

O88 R417

C635 Holt 1981, 54; n/a

O93 R190

C216 CNG, MBS 70 21st September 2005, 455; 16.41

O93 R257

C322 CNG, MBS 58 19th September 2001, 851; 16.44

O99 R113

C584 Mike R. Vosper, FPL 119 Sept/Oct 2001, 33; n/a

O99 R181

C207 CNG, Electronic Auction 126 9th November 2005, 111; 16.49

O99 R208

C240 Gorny & Mosch, Auction 134 11th October 2004, 1671; 16.29

O101 R183

C209 CNG, Electronic Auction 124 12th October 2005, 142; 16.32

O101 R306

C401 Gerhard Hirsch, Auction 212 22-24 November 2000, 431; Gerhard Hirsch, Auction 218 28-30 November 2001, 617; 15.79

O101 R312

C414 P.-F. Jacquier, FPL 33 Winter 2005, 194; 16.56

O102 R184

C210 Gorny & Mosch, Auction 142 10th October 2005, 1710; Gorny, Auction 97 11th October 1999, 603; 14.69

O102 R248

C305 CNG, Electronic Auction 59 26th February 2003, 81; 15.80

O102 R323

C427 B. Ahlström, Auction 63, 28-29 April 2001, 1973; n/a

O130 R255

C315 UBS Gold & Numismatics, Auction 55 16th September 2002, 1768; Gerhard Hirsch, Auction 229 17-20 September 2003, 2045; Hirsch, Auction 226 13-15 February 2003, 1698; Hirsch, Auction 237 24-26 November 2004, 461; Hirsch, Auction 244 15-18 February 2006, 1639; Ariadne Galleries, Auction 7 December 1982, 172; Pegasi, BBS 135 13 February 2007, 143; Pegasi, BBS 138 18 August 2009, 164; 15.54

C633 Holt 1981, 51 ;n/a

O130 R342

C472 CNG, MBS 39 18 September 1996, 853; 16.61

O134 R216

C399 Gerhard Hirsch, Auction 184 23-25 November 1994, 442; 16.30

O134 R263

C348 Münzen & Medaillen AG Basel, Auction 95 4th October 2004, 100; Münz Zentrum, Auction 88 7-9 January 1997, 179; CNG, Triton II 1/2 December 1998, 578; 16.45

O135 R283
C356 Feuardent, Hotel Drouot Talbot Ready Collection 7th July 1919, 589; Hess-Leu, Auction 31 1966, 557; Bank Leu AG Zürich, Auction 2 25 April 1972, 299; Bank Leu AG Zürich, Auction 13 29/30 April 1975, 319; NAC, Auction 2 21/22 February 1990, 236; Ariadne Galleries, Auction 7 December 1982, 171; Adolph Hess AG Luzern, Auction 31 6/7 December 1966, 557; 16.10
C492 Kovacs, MBS XVI 29 September 2004, 199; Münz Zentrum, Auction 101 15-18 December 1997, 164; 16.02

O139 R30
C398 Gerhard Hirsch, Auction 184 23-25 November 1994, 441; Gerhard Hirsch, Auction 187 19-23 September 1995; 16.50

O147 R324
C428 B. Ahlström, Auction 63, 28-29 April 2001, 1974; n/a

O147 R342
C453 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 302; Sotheby & Co., Auction 20th May 1986, 171; 15.79

O148 R166
C187 Gorny & Mosch, Auction 156 5th March 2007, 164; Münz Zentrum, Auction 46 21 April 1982, 180; Dr. Busso Peus Nachf., Auction 334 4 November 1992, 645; 16.26

O148 R257
C488 Kovacs, MBS XII 30 November 1995, 148; 16.37

O148 R325
C429 Ciani, Supplément Commercial Arethuse 1, 1924, 691bis; n/a

O149 R326
C430 Platt, Auction 3/4 April 1933, 199; n/a

O150 R28
C598 Tietjen & Co., Auction 104 17th December 2009, 235; 16.52

O150 R328
C432 Berliner Münz-Cabinet, Auction 13, 21/22 May 1981, 99; Holt 1981, 47; 16.25

O150 R351
C475 CNG, MBS 45 18 March 1998, 751; 16.02

O150 R415
C630 Holt 1981, 48; n/a

O161 R353
C478 CNG, MBS 47 16 September 1998, 743; 16.38

O176 R443
C615 Holt 1981, 30; n/a

A Group III (A16, A17) 

Obv. As above.
Rev. As above.

O10 R10
C10 BM, 1993.1106.17; Christie's London, Auction 9th October 1984, 22; 13.80

O10 R86

C93 HD Rauch, Auction 63 3rd May 2004, 80; Gerhard Hirsch Nachf., Auction 267 5th May 2010, 365; Hirsch Nachf., Auction 263 24th September 2009, 2504; Künker, Auction 67 9th October 2001, 518; HD Rauch, Auction 63 3-4th May 1999, 80; 16.23

O10 R119

C129 CNG, Electronic Auction 243 27th October 2010, 190; 15.61

O20 R24

C25 Ashmolean, H. De S. Shortt Bequest 1975; 16.20

O20 R263

C599 Senior Consultants, List Spring 2003, 23; n/a

O20 R418

C636 Holt 1981, 55; n/a

O59 R87

C94 Künker, Auction 216 8th October 2012, 547; Gorny, Auction 89 5th May 1998, 290; Gorny, Auction 90 12/13 October 1998, 517; 16.52

O59 R395

C567 Münz Zentrum Rhineland, Auction 157 12 January 2011, 226; 16.46

O69 R102

C109 CNG, Auction 88 14th September 2011, 590; CNG, Triton XIII 5th January 2010, 252; 16.35

C111 CNG, Electronic Auction 260 20th July 2011, 317;15.49

C163 CNG, MBS 78 14th May 2008, 1018; 16.26

C205 CNG, Triton IX 10th January 2006, 1111; 16.52

O69 R143

C159 Gorny & Mosch, Auction 169 12 October 2008, 150; CNG, Triton XI 8th January 2008, 354; 16.56

C204 CNG, Triton IX 10th January 2006, 1112; CNG, (Triton III) 30 November 1999, 685; 16.55

C528 Dr. Busso Peus Nachf., Auction 345 1-3 November 1995, 307a; Dr. Busso Peus Nachf., Auction 351 23-25 April 1997, 444; 16.28

O69 R146

C164 CNG, MBS 78 14th May 2008, 1019; 16.58

O69 R161

C182 CNG, MBS 75 23rd May 2007, 617; 16.53

O69 R178

C201 Gorny & Mosch, Auction 146 6th March 2006, 283; CNG, Triton VIII 11th January 2005, 620; 16.40

O69 R271

C339 CNG, MBS 57 4th April 2001, 709; 16.32

O69 R367

C509 The Numismatic Auction Ltd, "Ancient Coins" 3 1 December 1985, 171; 16.46

O71 R104

C112 CNG, Electronic Auction 260 20th July 2011, 316; Aï Khanum II 1973, 40; 15.08

O71 R110

C120 Jean Elsen, Auction 108 12th March 2011, 244; 15.71

O71 R139

C155 Spink, Auction 9008 19th March 2009, 364; 16.73

O71 R221

C263 Künker, Auction 89 8th March 2004, 1529; Munthandel G. Henzen, List 162 August 2005, 205; Munthandel G. Henzen, List 170 August 2006, 256; 16.03

O71 R295

C376 Gorny, Auction 96 7th June 1999, 269; Gorny, Auction 97 11th October 1999, 604; 16.06

O71 R301

C387 Gorny, Auction 101 6th March 2000, 477; Gorny & Mosch, Auction 104 9th-10th October 2000, 495; 16.26

C486 CNG, (Triton III) 30 November 1999, 686; 16.42

O71 R408

C610 German Private Collection, 8; 16.1

O83 R133

C147 CNG, Electronic Auction 222 11th November 2009, 224; 16.03

C487 Kovacs, MBS X 18 May 1990, 204; Holt 1981, 56; 16.00

O83 R164

C185 Gorny & Mosch, Auction 156 5th March 2007, 1567; 16.20

O87 R141

C157 Dr. Busso Peus Nachf., Auction 396 5th November 2008, 483; Gorny & Mosch, Auction 122 10th March 2003, 1549; 15.47

C226 CNG, Triton VIII 11th January 2005, 619; 16.54

O87 R252

C311 Dr. Busso Peus Nachf., Auction 372 30th October 2002, 750; 16.50

O87 R288

C364 Gorny, Auction 13 28th and 29th June 1979, 162; n/a

O132 R263

C328 CNG, MBS 58 19th September 2001, 853; 16.47

O132 R279

C347 NAC, Auction 49 21st October 2008, 106; NAC, Auction 29 11th May 2005, 232; 16.58

O143 R139

C409 Gerhard Hirsch, Auction 229 17-20 September 2003, 2046; 16.21

O143 R288

C637 Holt 1981, 57; n/a

O181 R441

C657 Holt 1981, 88; n/a

Mint B

B Group I (B2, B7, B9, B12) 

Obv. As above.
Rev. As above.
Die axis: six o'clock

O184 R34
C35 *BNBact*, 4; 15.55
O185 R35
C36 *BNBact*, 5; 16.35
O185 R175
C198 CNG, MBS 72 14th June 2006, 1020; 16.51
O186 R103
C110 CNG, Electronic Auction 261 3rd August 2011, 166; 16.12
O187 R103
C456 Sotheby & Co. Zürich, Auction 4/5 April 1973, 707; Sotheby London, Auction 7 July 1898, 303; 16.11

B Group II (CR1-CR3) 

Obv. As above.
Rev. As above.
Die axis: six o'clock

O1 R1
C1 BM, 1847.1201.26; 16.73
O1 R444
C614 Holt 1981, 29; n/a
O1 R446
C51 Qunduz Hoard, 9; 16.34
O5 R5
C5 BM, 1961.0301.8; 16.54
C86 *SNG* Lockett, 3349; Sotheby, Wilkinson & Hodge, Charles Butler Collection Auction 10th July 1911, 175; 16.45
O5 R115
C125 CNG, Electronic Auction 246 15th December 2010, 182; 16.50
O60 R89
C96 Jean Elsen, Auction 113 16th June 2012, 195; Gerhard Hirsch, Auction 14-16th December 1976, 42; Sotheby & Co. Zürich, Auction 27/28 October 1993, 909; Berk, BBS 81, 31 March 1994, 258; 16.01
O60 R222
C266 CNG, Electronic Auction 84 3rd March 2004, 93;16.57
C406 Gerhard Hirsch, Auction 217 27-29 September 2001, 1751; Münzen Auktion Essen, Auction 66 1-3 December 1993, 173; 14.70
C420 Kurpfälzische Münzhandlung, Auction 60 June 2001, 101; Aï Khanum II 1973, 15; 15.24

O60 R232
C282 CNG, Electronic Auction 73 17th September 2003, 39; 16.54
C607 German Private Collection, 4; 16.7
O60 R381
C539 Aï Khanum II 1973, 14; 15.66
O60 R382
C540 Aï Khanum II 1973, 16; 15.04
O60 R406
C601 Terry Hardaker Collection, 1; 15.36
O60 R412
C617 Holt 1981, 32; n/a
O105 R33
C283 CNG, Electronic Auction 65 28th May 2003, 33; CNG, Electronic Auction 59 26th February 2003, 82; 16.36
C292 Gorny & Mosch, Auction 122 10th March 2003, 1539; 16.20
C321 CNG, MBS 58 19th September 2001, 855; 16.46
O105 R193
C219 CNG, Electronic Auction 122 7th September 2005, 172; Senior Consultants, List Spring 2003, 18; 16.53
O105 R222
C597 Tietjen & Co., Auction 24 10th June 1980, 29; n/a
O133 R267
C335 CNG, MBS 57 4th April 2001, 708; 16.62
O165 R447
C506 Spartan Numismatics, BBS 12 12 October 1999, 94; n/a
O188 R33
C34 *BNBact*, 3; 14.92
O189 R11
C11 BM, 1993.1106.16; 15.77
C154 CNG, Electronic Auction 208 8th April 2009, 146; 16.26
O190 R411
C616 Holt 1981, 31; n/a

B Group III (CR4)

Obv. As above.
Rev. As above.
Die axis: six o'clock

O3 R3
C3 BM, 1987.0649.497; Rollin and Feuardent, Auction 14-26 May 1888, 2450; 16.44
C119 CNG, Electronic Auction 252 23rd March 2011, 200;16.54
C619 Holt 1981, 34; n/a
O3 R21
C22 Ashmolean, Oman 1947; 16.39
C258 Künker, Auction 89 8th March 2004, 1530; Münzen Auktion Essen, Auction 65 26-28 May 1993, 266; Münzen Auktion Essen, Auction 66 1-3 December 1993, 174; Munthandel G. Henzen, List

149 June 2004, 157; 16.89

O3 R22

C517 Münz Zentrum, Auction 50 November 1983, 245; 15.84

O3 R38

C593 Spink Coin Auctions, Auction 25 25 November 1982, 135; 16.47

O3 R356

C482 CNG, MBS 51 15 September 1999, 690; 14.20

O4 R4

C4 BM, India Office Collection 2; 15.94

C527 Dr. Busso Peus Nachf., Auction 345 1-3 November 1995, 306a; 15.83

O4 R6

C13 BM, 1888.1208.77; 16.52

C63 *SNG* ANS, 122; 15.96

O6 R6

C6 BM, 1860.1220.6; 16.54

C620 Holt 1981, 35; n/a

O6 R22

C23 Ashmolean, H. De S. Shortt Bequest 1975; 16.00

O6 R62

C64 *SNG* ANS, 123; 15.94

O6 R76

C80 *SNG* Copenhagen, 253; 16.39

C303 Gorny & Mosch, Auction 122 10th March 2003, 231; 15.74

O6 R289

C366 Gorny, Auction 13 28th and 29th June 1979, 164; Dr. Busso Peus Nachf., Auction 301 25-27 May 1981, 559; Dr. Busso Peus Nachf., Auction 323 1-4 November 1988, 1002; n/a

O25 R29

C30 Ashmolean, Hollis Collection; 16.09

O31 R36

C37 *BNBact*, 6; 16.56

O31 R235

C287 CNG, MBS 63 21st May 2003, 930; 16.40

O31 R289

C618 Holt 1981, 33; n/a

O31 R333

C440 H. Grün Heidelberger Münzhandlung, Auction 32 15/16 May 2001, 306; 15.49

O32 R37

C38 *BNBact*, 7; 16.54

O32 R38

C39 *BNBact*, 8; 15.67

C360 Athena, Lagerliste 19, 1993, 84; 16.13

O32 R404

C591 Sotheby Parke Bernet A.G. Zürich, Auction 10th June 1977, 198; 16.17

B Group IV (B13) 𐤒

Obv. As above.
Rev. As above.

O13 R13
C14 BM, 1888.1208.75; 16.40
O14 R14
C15 BM, 1835.BUR 1; 16.37
O14 R118
C279 Spink, Auction 3014 8th October 2003, 131; 16.55
O14 R422
C642 Holt 1981, 62; n/a
O27 R31
C32 Ashmolean, Hollis Collection; 16.49
O27 R44
C410 Gerhard Hirsch, Auction 237 24-26 November 2004, 462; 15.57
O27 R205
C237 Gorny & Mosch, Auction 134 11th October 2004, 1673; 16.44
C265 CNG, Electronic Auction 84 3rd March 2004, 92; 16.08
C580 C.J. Martin (Coins) Ltd, Vol XX No. 3 August 1993, G91; n/a
O27 R211
C247 HD Rauch, Auction 73 17th May 2004, 363; 16.47
O27 R265
C331 Numismatik Lanz München, Auction 102 28th May 2001, 339; 16.04
O27 R401
C581 Senior Consultants, List Undated, 3; n/a
O37 R44
C45 *BNBact*, 14; 15.89
O37 R116
C126 Spink, Auction 1012 2nd December 2010, 1275; 15.62
O37 R211
C519 Münz Zentrum, Auction 86 11-13 September 1996, 108; 15.80
O37 R383
C543 Aï Khanum II 1973, 19; 14.89
O50 R71
C74 *SNG* ANS, 136; 16.00
O50 R140
C433 Berliner Münz-Cabinet, Auction 13, 21/22 May 1981, 100; 15.67
O50 R212
C249 CNG, Electronic Auction 89 5th May 2004, 13; 16.47
O66 R97
C104 CNG, Electronic Auction 274 22nd February 2012, 213; Dr. Busso Peus Nachf., Auction 361 3-6 November 1999, 360; J. Schulman, Auction 24 November 1913 (Collection de Mr Le Dr M.A. Kreling), 781; Glendining & Co. Ltd, Auction 16th November 1950, 223; 16.30

O66 R270
C338 CNG, MBS 57 4th April 2001, 714; 16.52
O66 R352
C476 CNG, MBS 46 24 June 1998, 610; Fred B. Shore, FPL 82 October 1997, 35; Fred B. Shore, FPL 119 November 2005, 17; 16.60
O66 R419
C638 Holt 1981, 58; 16.31
O67 R31
C396 Gerhard Hirsch, Auction 150 5-7 May 1986, 267; 15.67
O67 R71
C579 Glendining & Co. Ltd, Auction 28th January 1998, 96; 15.9
O67 R97
C173 Stack, 18th December 2007, 237; Stack, 21st February 2007, 115; CNG, Triton VIII 11th January 2005, 623; 16.61
O67 R99
C106 Stack, Sale 163 16th November 2011, 20834; CNG, Electronic Auction 124 12th October 2005, 144; 15.97
O67 R116
C613 CNG, Triton II 1/2 December 1998, 579; 16.39
O67 R118
C128 Hess-Divo AG, Auction 317 27th October 2010, 319; 15.71
C143 CNG, Triton XIII 5th January 2010, 1365; 16.03
O67 R127
C570 Aureo, Auction 24 January 2001, 15; 16.24
O67 R212
C351 Jean Elsen, Vente Publique 46 21st September 1996, 366; Lanz München, Auction 74 20 November 1995, 297; 16.61
C459 Sotheby & Co. Zürich, Auction 27/28 October 1993, 911; 15.41
O67 R261
C326 CNG, MBS 58 19th September 2001, 856; UBS Gold & Numismatics, Auction 63 6th September 2005, 241; 16.57
O67 R284
C358 Claude Burgan Numismatique, 5th November 1993, 154; 16.39
O67 R305
C640 Holt 1981, 60; n/a
O67 R358
C485 CNG, MBS 51 15 September 1999, 695; 15.94
O67 R360
C496 Fred B. Shore, MBS 80 22 May 1997, 45; Pegasi, MBS I 8 September 1995, 202; 16.56
O67 R420
C639 Holt 1981, 59; n/a
O67 R421
C641 Holt 1981, 61; n/a
O68 R100
C107 Gerhard Hirsch Nachf., Auction 275 22nd September 2011, 4107; Gorny, Auction 38 30th November 1987, 281; J. Schulman, Auction 17-19 May 1938, 1428; 16.48
C566 Münz Zentrum Rhineland, Auction 143 16/17 April 2008, 140; 16.60

O68 R144

C160 CNG, MBS 79 17th September 2008, 493; 16.49

O75 R121

C131 Künker, Auction 174 27th September 2010, 455; Künker, Auction 226 11th March 2013, 621; 16.00

O75 R140

C156 Hauck & Aufhäuser, Auction 21 17th March 2009, 219; 16.30

C524 Dr. Busso Peus Nachf., Auction 318 7 May 1987, 1371; 16.36

O75 R290

C367 Gorny, Auction 64 11th October 1993, 243; 16.50

O76 R123

C134 CNG, Auction 85 15th September 2010, 554; CNG, Auction 93 22 May 2013, 676; 16.55

O76 R284

C596 iNumis, Auction 5 21st March 2008, 75; iNumis, Auction 9 23rd October 2009, 64; 15.57

O76 R318

C574 John Cummings Ltd, FPL May 1997, G145; n/a

O80 R127

C140 Stack, Auction 28th April 2010, 191; 15.79

C402 Gerhard Hirsch, Auction 212 22-24 November 2000, 432; H H Kricheldorf Nachf., Auction 46 17 July 1998, 42; 15.88

O80 R291

C369 Gorny, Auction 71 3rd May 1995, 459; Gorny, Auction 96 7th June 1999, 268; 16.57

C542 Aï Khanum II 1973, 18; 15.10

O80 R407

C603 Sammlung Köhler-Osbahr, 115; 16.28

O95 R123

C191 CNG, Triton X 9th January 2007, 448; Baldwin's Auctions Ltd, The New York Sale XI 11th January 2006, 442; Jesus Vico, S.A., Auction 113, 8 March 2007, 156; 16.55

C254 Künker, Auction 89 8th March 2004, 1531; Münz Zentrum, Auction 65 9 November 1988, 417; 16.33

O95 R211

C490 Kovacs, MBS XIV 16 October 1998, 82; 16.53

O95 R242

C297 Gorny & Mosch, Auction 122 10th March 2003, 233; Münzen Auktion Essen, Auction 70 6-8 December 1995, 134; 16.57

O95 R275

C343 Stephen Album Rare Coins, Auction 14 21st September 2012, 1017; 15.84

O117 R226

C272 CNG, Triton VII 12th January 2004, 694; 16.55

O138 R305

C394 Gerhard Hirsch, Auction 14-16th December 1976, 41; 15.85

O141 R308

C404 Gerhard Hirsch, Auction 212 22-24 November 2000, 434; Gerhard Hirsch, Auction 208 17-19 February 2000, 1909; 14.65

O141 R423

C643 Holt 1981, 63; n/a

O141 R425
C645 Holt 1981, 65; n/a
O152 R332
C438 Adolph E. Cahn, Auction 66 9 May 1930, 459; 16.25
O153 R335
C442 Dr Jacob Hirsch, Auction 21, 16 November 1908, 4412; 15.80
O157 R344
C458 Sotheby & Co. Zürich, Auction 4/5 April 1973, 709; 15.99
O167 R205
C516 Münz Zentrum, Auction 46 21 April 1982, 181; 15.70
O169 R270
C612 German Private Collection, 10; 16.6
O169 R379
C536 Auctiones A.G., Basel, Auction 18 21/22 September 1989, 864; 16.51
O170 R379
C541 Aï Khanum II 1973, 17; 14.49
O177 R424
C644 Holt 1981, 64 ;n/a

B Group V (B14, B15) 𐤊

Obv. As above.
Rev. As above. Club resting on thigh.

O15 R451
C17 BM, 1858.0731.2; 16.12
O22 R26
C27 Ashmolean, Sir A. Cunningham 1889; 16.50
C372 Gorny, Auction 82 29th April 1997, 160; 16.55
C477 CNG, MBS 46 24 June 1998, 611; 16.14
O22 R56
C57 Qunduz Hoard, 15; 16.33
O22 R72
C655 Holt 1981, 80; n/a
O22 R154
C174 CNG, Electronic Auction 177 28th November 2007, 137;16.45
C508 Fred B. Shore, FPL 98 October 2001, 26; Leu Numismatik, Zürich Auction 72 12 May 1998, 371; NAC, Auction 2 21/22 February 1990, 235; 16.41
O22 R167
C188 Gorny & Mosch, Auction 156 5th March 2007, 1566; 15.38
O22 R274
C342 Numismatik Lanz München, Auction 97 22nd May 2000, 361; German Private Collection, 5; 16.52
O22 R287
C362 Bankhaus Aufhäuser, Auction 21-22 March 1995, 170; 16.51

O22 R314

C416 H H Kricheldorf Nachf., Auction 15/16 July 1996, 85; 15.98

O22 R315

C417 Künker, Auction 35 11-14 March 1997, 252; Künker, Auction 43 29/30 September 1998, 195; H. Grün Heidelberger Münzhandlung, Auction 43 10/11 May 2005, 417; 16.10

O36 R43

C44 *BNBact*, 13; 16.07

C81 *SNG* Copenhagen, 254; 16.24

O36 R57

C58 Qunduz Hoard, 16; 16.79

O36 R58

C59 Qunduz Hoard, 17; 16.38

O36 R343

C454 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 303; 16.03

O40 R47

C48 Bibliothèque Royale de Belgique, 2; 12.57

C76 *SNG* ANS, 138; 16.38

O40 R196

C227 CNG, Electronic Auction 102 24th November 2004, 146; 16.18

O40 R280

C353 Jean Elsen, Vente Publique 64 2nd December 2000, 261; Jean Elsen, Vente Publique 65 17th-18th March 2001, 441; Auctiones A.G., Basel, Auction 7 7/8 June 1977, 336; n/a

O40 R285

C608 German Private Collection, 6; 15.4

O40 R370

C512 Münz Zentrum, Auction 39 16 April 1980, 724; Sammlung Köhler-Osbahr, 117; 15.87

O40 R432

C653 Holt 1981, 77; n/a

O41 R48

C49 Bibliothèque Royale de Belgique, Coll. De Hirsch; 15.97

O41 R134

C268 CNG, Electronic Auction 83 18th February 2004, 77; 16.57

O41 R218

C260 Gorny & Mosch, Auction 130 8th March 2004, 1674; 16.55

O41 R264

C329 CNG, MBS 58 19th September 2001, 857; 16.54

O41 R347

C535 Auctiones A.G., Basel, Auction 4 26/27 November 1974, 182; 15.94

O41 R355

C481 CNG, MBS 49 17 March 1999, 837; 16.24

O43 R59

C60 Qunduz Hoard, 18; 16.21

O43 R234

C407 Gerhard Hirsch, Auction 215 2-4 May 2001, 417; 13.96

O51 R72

C388 Adolph Hess AG Luzern, Auction 45 12/13 May 1970, 393; *SNG* ANS, 137; 16.46

O51 R192
C218 CNG, Electronic Auction 122 7th September 2005, 171; 16.53
O51 R317
C419 Kurpfälzische Münzhandlung, Auction 60 June 2001, 100; 16.44
O51 R370
C577 Bloomsbury Auctions, Auction 15/16 December 2005, 521; 14.5
O51 R400
C576 Baldwin, Autumn Argentum Auction 6th November 2004, 14; 15.42
O55 R72
C288 CNG, MBS 63 21st May 2003, 925; 16.51
O55 R79
C84 Museum of Fine Arts Boston, 2235; Dr Jacob Hirsch, Auction 13, 15 May 1905, 4551; 16.50
O55 R192
C397 Gerhard Hirsch, Auction 169 20-22 February 1991, 598a; 16.40
O55 R197
C228 CNG, Electronic Auction 99 13th October 2004, 53; 16.33
O55 R209
C242 CNG, MBS 67 22nd September 2004, 1010; 16.29
C457 Sotheby & Co. Zürich, Auction 4/5 April 1973, 708; 16.18
O55 R292
C467 CNG, MBS 30 11 June 1994, 221; 16.54
O55 R315
C586 Sotheby, Wilkinson & Hodge, Montagu Collection Auction 23rd March 1896, 773; 16.52
O58 R58
C460 Sotheby & Co. Zürich, Auction 27/28 October 1993, 912; 16.27
O58 R83
C89 *SNG* Blackburn, 1129; 16.25
C390 Dr Jacob Hirsch, Auction 29th November 1909, 3135; Dr Jacob Hirsch, Auction 17th November 1913, 931; 14.54
O65 R72
C135 CNG, Auction 85 15th September 2010, 555; Gorny & Mosch, Auction 164 17th March 2008, 270; Gorny, Auction 64 11th October 1993, 242; 16.57
O65 R96
C103 Gorny & Mosch, Auction 204 5th March 2012, 1652; Gorny & Mosch, Stuttgart Auction 1 22nd November 2010, 303; Gorny & Mosch, Auction 175 9th March 2009, 159; Stack, Auction 17th December 2008, 135; Pegasi, MBS XVI 8 May 2007, 188; 16.54
O65 R108
C117 CNG, Electronic Auction 252 23rd March 2011, 199; 16.63
O65 R332
C446 Münzen Auktion Essen, Auction 65 26-28 May 1993, 269; Münzen Auktion Essen, Auction 66 1-3 December 1993, 175; 15.65
O65 R343
C592 Sotheby & Co., Auction 20th May 1986, 172; n/a
O65 R375
C525 Dr. Busso Peus Nachf., Auction 340 2 November 1994, 593; Dr. Busso Peus Nachf., Auction 345 1-3 November 1995, 308; Dr. Busso Peus Nachf., Auction 355 27-29 April 1998, 776; 16.90

O65 R426

C646 Holt 1981, 70; n/a

O84 R134

C148 Dr. Busso Peus Nachf., Auction 399 4th November 2009, 190; CNG, MBS 61 25th September 2002, 949; Gemini LLC, Auction 49 21st October 2008, 244; 16.55

C313 CNG, MBS 61 25th September 2002, 950; 16.58

O84 R215

C255 Gorny & Mosch, Auction 130 8th March 2004, 1673; 16.55

O96 R170

C192 Gorny & Mosch, Auction 152 10th October 2006, 1546; CNG, MBS 51 15 September 1999, 694; Kovacs, MBS XV 1 October 2003, 175; 16.47

O96 R292

C370 Gorny, Auction 78 13th June 1996, 307; Gorny, Auction 81 3rd March 1997, 437; 16.60

C493 Dmitry Markov, MBS 6 9/10 December 1998, 74; 16.23

O96 R300

C383 Gorny, Auction 101 6th March 2000, 473; 16.36

O96 R347

C466 CNG, MBS 30 11 June 1994, 220; 16.55

O96 R428

C648 Holt 1981, 72; n/a

O103 R187

C213 Spink, Auction 5020 30th September 2005, 559; Spink Coin Auctions, Auction 13 October 1993, 41; 16.51

O103 R188

C214 Spink, Auction 5020 30th September 2005, 560; 16.55

C463 Berk, BBS 96, 18 June 1997, 177; n/a

O103 R430

C650 Holt 1981, 74; n/a

O116 R47

C545 Aï Khanum II 1973, 21; 15.74

O116 R225

C270 CNG, Electronic Auction 82 4th February 2004, 27; 16.38

O116 R280

C595 Brüder Egger, Auction 11th May 1914, 2680; 15.65

O119 R98

C105 Ira and Larry Goldberg, Auction 67 31st January 2012, 3225; Pegasi, MBS XXVIII 28 May 2013, 251; 15.96

O119 R118

C371 Gorny, Auction 79 14th October 1996, 324; Dmitry Markov, MBS 10 23 October 2001, 203; Münz Zentrum, Auction 82 6-8 September 1995, 248; 16.62

C505 Pegasi, BBS 136 21 August 2007, 149; Spartan Numismatics, BBS 46 10 June 2008, 126; 16.22

O119 R231

C281 CNG, MBS 64 24th September 2003, 544; 16.54

O121 R234

C286 CNG, MBS 63 21st May 2003, 924; 16.66

O121 R266

C334 CNG, MBS 57 4th April 2001, 715; 15.96

O129 R254
C314 CNG, MBS 61 25th September 2002, 948; 16.54 *misspelled reverse*
O136 R192
C425 B. Ahlström, Auction 60, 13 November 1999, 1158; 15.21
O136 R209
C368 Gorny, Auction 69 18th November 1994, 469; Gorny, Auction 87 2nd March 1998, 308; P.-F. Jacquier, FPL 22 Spring 1999, 255; 16.61
O136 R285
C359 Maison Palombo, 13th June 2009, 126; CNG, MBS 39 18 September 1996, 855; 16.48
O136 R370
C609 German Private Collection, 7; 16.5
O136 R452
C384 Gorny, Auction 101 6th March 2000, 474; 15.61
O137 R294
C374 Gorny, Auction 92 20/21 November 1998, 350; 13.98
O140 R307
C403 Gerhard Hirsch, Auction 212 22-24 November 2000, 433; Gerhard Hirsch, Auction 208 17-19 February 2000, 1908; 14.76
O145 R318
C421 Lanz München, Auction 26 5 December 1983, 323; 16.35
C464 CNG, Auction 26 11 June 1993, 379; 16.35
O158 R345
C462 Berk, BBS 80, 18 January 1994, 282b; n/a
O159 R348
C469 CNG, MBS 33 15 March 1995, 463; 16.57
O162 R212
C494 Dmitry Markov, MBS 6 9/10 December 1998, 75; 15.73
O163 R26
C544 Aï Khanum II 1973, 20; 15.93
O163 R209
C652 Holt 1981, 76; n/a
O163 R362
C501 Pegasi, MBS XIII 8 November 2005, 242; 16.15
O163 R431
C651 Holt 1981, 75; n/a
O175 R402
C582 Italo Vecchi Ltd, London Auction 2 13th September 1996, 616; 16.24
O178 R427
C647 Holt 1981, 71; n/a
O179 R429
C649 Holt 1981, 73; n/a
O180 R433
C654 Holt 1981, 78; n/a

B Group VI (B17) 𐤓

Obv. As above.
Rev. As above.

O52 R73
C77 *SNG* ANS, 141; 16.00
O52 R101
C108 Gerhard Hirsch Nachf., Auction 275 22nd September 2011, 4108; 16.55
O52 R112
C122 Gorny & Mosch, Auction 196 7th March 2011, 1940; Münz Zentrum, Auction 46 21 April 1982, 182; 15.83
O52 R302
C389 Adolph Hess Nachf., Auction 1st December 1931, 732; 15.78
O64 R95
C102 Spink, Auction 12009 28th March 2012, 121; Sotheby & Co., Auction 20th May 1986, 173; 15.98
O64 R105
C113 Stack's Bowers Galleries, Auction 7th July 2011, 916; 15.77
C375 Gorny, Auction 95 9th March 1999, 427; 15.74
O64 R397
C572 Alpha Bank Numismatic Collection, 4103; 16.10
O74 R117
C127 CNG, Electronic Auction 245 1st December 2010, 233; 15.42
C248 Leu Numismatik, Auction 90 10th May 2004, 196; 16.64
O77 R124
C136 CNG, Electronic Auction 237 21st July 2010, 57; 16.47
C175 Dr. Busso Peus Nachf., Auction 393 31st October 2007, 366; Gorny & Mosch, Auction 156 5th March 2007, 1565; Numismatik Lanz München, Auction 117 24th November 2003, 429; 16.56
O77 R163
C184 Jean Elsen, Auction 91 24th March 2007, 179; 16.39
O77 R293
C373 Gorny, Auction 84 13th October 1997, 5435; Lanz München, Auction 56 13 May 1991, 288; Dr. Busso Peus Nachf., Auction 311 31 October 1984, 466; Dr. Busso Peus Nachf., Auction 323 1-4 November 1988, 1003; Dr. Busso Peus Nachf., Auction 333 6-11 May 1992, 523; 15.64
O82 R130
C144 CNG, Electronic Auction 223 2nd December 2009, 260; 16.17
O82 R138
C152 CNG, Electronic Auction 215 29th July 2009, 322; CNG, Electronic Auction 73 17th September 2003, 40; 16.48
C666 Catalogue of Coins in the Panjab Museum,8; 16.59
C587 J. Schulman, Collection L. White September 1904, 9; n/a
O82 R329
C434 Berliner Münz-Cabinet, Auction 13, 21/22 May 1981, 101; Holt 1981, 93; 15.03
C656 Holt 1981, 87; n/a
O90 R73
C571 Artemide Asta, MBS 23 February 2004, 111; 15.40

O90 R124
C221 CNG, MBS 69 8th June 2005, 796; 16.52
C284 CNG, MBS 63 21st May 2003, 927; 16.50
O90 R147
C165 CNG, MBS 78 14th May 2008, 1017; 16.59
O100 R112
C308 CNG, Electronic Auction 56 8th January 2003, 42; 16.26
O100 R182
C208 CNG, Electronic Auction 124 12th October 2005, 145; 16.19
O100 R293
C548 Aï Khanum II 1973, 24; 14.40
O100 R385
C547 Aï Khanum II 1973, 23; 15.98
O100 R435
C659 Holt 1981, 91; n/a
O100 R440
C665 Holt 1981, 107; n/a
O100 R453
C658 Holt 1981, 89; n/a
O122 R73
C392 Dr Jacob Hirsch, Auction 6th May 1912, 504; 15.90
O122 R117
C400 Gerhard Hirsch, Auction 180 24-26 November 1993, 436; 15.98
C455 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 304; 15.98
O122 R220
C500 Pegasi, MBS II 8 June 1996, 155; n/a
O122 R237
C290 CNG, MBS 63 21st May 2003, 929; 16.52
O122 R268
C336 CNG, MBS 57 4th April 2001, 716; 16.55
O122 R346
C465 CNG, Auction 26 11 June 1993, 380; 16.48
O122 R378
C534 Aretusa, Auction 2 13/14 May 1994 , 185; 16.58
C594 Spink Coin Auctions, Auction 13 October 1993, 43; 16.53
O122 R399
C575 Lennox Gallery Ltd, FPL 1 March 1996, G56; n/a
O128 R250
C307 CNG, Electronic Auction 56 8th January 2003, 41; 15.67
O128 R363
C503 Pegasi, MBS XXII 20 April 2010, 229; 15.98
O128 R368
C510 World Numismatic Auctions, 1 1 December 2007, 446; 16.35
O144 R316
C418 Gorny, Auction 13 28th and 29th June 1979, 163; Holt 1981, 108; Kurpfälzische Münzhandlung, Auction 17 December 1979, 192; Dr. Busso Peus Nachf., Auction 299 6-8 May 1980, 229; n/a

O182 R112
C660 Holt 1981, 92; n/a

B Group VII (B17) ᚱ

Obv. As above.
Rev. As above.

O16 R17
C18 BM, 1856.1105.3; 16.64
C245 CNG, Electronic Auction 91 9th June 2004, 88; 16.43
O16 R20
C21 BM, 1888.1208.76; 16.44
C224 Künker, Auction 97 7th March 2005, 997; 16.39
C529 Felix Schlessinger, 4 February 1935, 1522; 14.10
O16 R60
C61 Qunduz Hoard, 19; 15.87
C153 Comptoir Général Financier, MBS 38 30th April 2009, 362; 16.35
O16 R74
C602 Terry Hardaker Collection, 2; 16.04
O16 R85
C92 Noble Numismatics, Auction 62 17th/18th November 1999, 1934; 14.35
O16 R155
C176 Münzen & Medaillen Deutschland, 18th October 2007, 2180; Gerhard Hirsch, Auction 233 12-14 February 2004, 1556; 16.24
O16 R177
C200 Spink, Auction 6003 30th March 2006, 1051; 16.23
O16 R286
C361 Bankhaus Aufhäuser, Auction 5-6 October 1993, 303; 16.26
O16 R340
C449 Münzen Auktion Essen, Auction 75 6 May 1998, 287; 16.00
O17 R18
C19 BM, 1922.0424.107; 16.13
O17 R32
C33 Ashmolean, Hollis Collection; 15.99
C470 CNG, MBS 33 15 March 1995, 464; 16.16
O17 R129
C206 CNG, Electronic Auction 129 21st December 2005, 178; 15.13
O17 R151
C439 Adolph E. Cahn, Auction 80 27 February 1933, 434; 16.30
O18 R19
C20 BM, G 1157; 16.38
O18 R32
C554 Aï Khanum II 1973, 30; 15.60
O18 R45
C395 Gerhard Hirsch, Auction 135 19th-21st January 1983, 539; 16.24

O18 R49
C50 Bibliothèque Royale de Belgique, Coll. De Hirsch; 16.56
O18 R80
C259 Gorny & Mosch, Auction 130 8th March 2004, 1677; 16.35
O18 R117
C317 Leu Numismatik, Auction 83 6th May 2002, 429; 16.59
O18 R148
C166 CNG, Electronic Auction 187 30th April 2008, 73; 16.56
C530 Münzhandlung Schulten, Auction 20-22 October 1987, 289; 16.31
O18 R230
C357 Bourgey, Auction 20th June 1979; 16.34
O18 R330
C435 Berliner Münz-Cabinet, Auction 13, 21/22 May 1981, 102; 15.99
O18 R349
C473 CNG, MBS 41 19 March 1997, 960; 15.77
O21 R25
C26 Ashmolean, Oman 1947; 16.52
O21 R61
C520 Münz Zentrum, Auction 101 15-18 December 1997, 165; 15.60
O21 R77
C411 Gerhard Hirsch, Auction 237 24-26 November 2004, 463; 16.30
O21 R81
C250 CNG, Electronic Auction 86 31st March 2004, 48; 16.26
O21 R220
C564 Bank Leu AG Zürich, Auction 13 29/30 April 1975, 320; NAC, Auction 2 21/22 February 1990, 237; Leu Numismatik, Zürich Auction 72 12 May 1998, 372; 16.51
O21 R276
C344 Stephen Album Rare Coins, Auction 14 21st September 2012, 1019; 14.73
O38 R45
C46 *BNBact*, 16; 16.49
O38 R77
C82 *SNG* Copenhagen, 255; 15.82
O44 R61
C62 Qunduz Hoard, 20; 15.74
O53 R74
C78 *SNG* ANS, 142; 15.99
C330 CNG, MBS 58 19th September 2001, 858; 16.30
O53 R151
C526 Dr. Busso Peus Nachf., Auction 343 26-28 April 1995, 306; Dr. Busso Peus Nachf., Auction 345 1-3 November 1995, 309; 16.56
O53 R171
C194 CNG, Electronic Auction 149 4th October 2006, 142; CNG, MBS 60 22nd May 2002, 1102; Kölner Münzkabinett, Auction 21 4/5 April 1977, 123; 16.14
O53 R228
C386 Gorny, Auction 101 6th March 2000, 476; 15.14
O53 R320
C423 Lanz München, Auction 86 18 May 1998, 219; 15.55

O53 R361
C499 Pegasi, MBS II 8 June 1996, 154; n/a
O56 R80
C85 Museum of Fine Arts Boston, 2236; 16.55
C518 Münz Zentrum, Auction 65 9 November 1988, 416; 15.98
O56 R147
C590 Sotheby & Co., Haughton Collection 1st May 1958, 287; 16.59
O56 R176
C199 CNG, MBS 72 14th June 2006, 1022; CNG, MBS 63 21st May 2003, 928; n/a
O57 R25
C132 CNG, Auction 85 15th September 2010, 556; CNG, MBS 61 25th September 2002, 951; 16.53
O57 R49
C161 CNG, MBS 79 17th September 2008, 494; 16.46
O57 R80
C91 Ball State University Museum of Art, 2000.017.104; 16.28
O57 R81
C87 *SNG* Lockett, 3350; Sotheby, Wilkinson & Hodge, Charles Butler Collection Auction 10th July 1911, 181; 16.57
C244 CNG, Electronic Auction 96 18th August 2004, 84; 16.49
C568 Aureo, Auction 29 September 1998, 76; 15.53
O57 R82
C88 SNG Fitzwilliam, 1165; Sotheby & Co., Auction 14th November 1881, 673; 16.56
O57 R186
C212 Gorny & Mosch, Auction 142 10th October 2005, 1712; Gorny & Mosch, Auction 134 11th October 2004, 1674; 16.30
O57 R201
C513 Münz Zentrum, Auction 39 16 April 1980, 725; Sammlung Köhler-Osbahr, 116; 16.22
O57 R286
C385 Gorny, Auction 101 6th March 2000, 475; 16.60
O57 R341
C450 Münzen Auktion Essen, Auction 75 6 May 1998, 288; 15.93
O57 R364
C504 Pegasi, BBS 132 25 January 2005, 163; 16.33
C583 Italo Vecchi Ltd, London Auction 2 13th September 1996, 617; 16.24
O57 R437
C662 Holt 1981, 101; n/a
O72 R19
C116 CNG, Electronic Auction 253 6th April 2011, 211; 16.31
O72 R74
C172 CNG, Electronic Auction 179 2nd January 2008, 115; 16.30
O72 R129
C142 CNG, Electronic Auction 225 13th January 2010, 190; 16.51
O72 R151
C169 CNG, Electronic Auction 187 30th April 2008, 72; 16.45
C277 Gorny & Mosch, Auction 126 14th October 2003, 1503; 16.32
C363 Adolph E. Cahn, Auction 71 14th October 1931, 658; 16.30

O72 R177
C278 Spink, Auction 3014 8th October 2003, 132; 16.19
O72 R228
C274 CNG, Electronic Auction 78 26th November 2003, 62; 16.34
C309 CNG, Electronic Auction 55 18th December 2002, 65; 16.25
O72 R236
C289 CNG, MBS 63 21st May 2003, 926; 16.44
O72 R338
C447 Münzen Auktion Essen, Auction 65 26-28 May 1993, 270; 15.64
O106 R129
C253 Gorny & Mosch, Auction 130 8th March 2004, 1676; 16.28
O106 R194
C222 CNG, MBS 69 8th June 2005, 797; 16.17
C302 Gorny & Mosch, Auction 122 10th March 2003, 1548; 16.38
O106 R322
C426 B. Ahlström, Auction 62, 11-12 November 2000, 1898; n/a
O108 R82
C271 CNG, Electronic Auction 81 21st January 2004, 55; CNG, Electronic Auction 72 3rd September 2003, 60; 16.54
O108 R198
C229 CNG, Electronic Auction 99 13th October 2004, 54; CNG, MBS 66 19th May 2004, 944; 16.32
O109 R201
C233 Gorny & Mosch, Auction 134 11th October 2004, 1675; 16.30
O109 R321
C424 Antiquarius, List 35, June 1995, 27; Downie's Australian Coin Auctions, 16/17 February 1995, 1184; Antiquarius, List 40, June 1997, 41; Antiquarius, List 42, 10th May 1998, 39; n/a
O109 R384
C546 Aï Khanum II 1973, 22; 16.07
O114 R214
C252 Künker, Auction 89 8th March 2004, 1532; Münzen Auktion Essen, Auction 66 1-3 December 1993, 176; 15.21
O114 R220
C262 Gorny & Mosch, Auction 130 8th March 2004, 1678; 16.38
O118 R60
C565 Bank Leu AG Zürich, Auction 15 4/5 May 1976, 356; 16.32
O118 R230
C280 CNG, MBS 64 24th September 2003, 545; 16.54
O146 R319
C422 Lanz München, Auction 68 6 June 1994, 266; Leu Numismatik, Auction 83 6-7 May 2002, 429; 16.56
O146 R439
C664 Holt 1981, 106; n/a
O154 R339
C448 Münzen Auktion Essen, Auction 66 1-3 December 1993, 177; 15.23
O154 R438
C663 Holt 1981, 103; n/a

O155 R32

C555 Aï Khanum II 1973, 31; 15.00

O155 R80

C452 Münzhandlung Basel, 4 1 October 1935, 913; Auctiones A.G., Basel, Auction 24 23/24 June 1994, 371; 16.12

C461 Tkalec, 28 October 1994, 131; 16.56

O155 R129

C549 Aï Khanum II 1973, 25; 15.38

O155 R151

C538 Spink & Son Ltd/Galerie des Monnaies SA, Genève Auction 10 October 1977, 307; 15.81

O155 R201

C550 Aï Khanum II 1973, 26; 15.52

C551 Aï Khanum II 1973, 27; 15.11

O155 R364

C578 Glendining & Co. Ltd, Auction 25th May 1988, 152; n/a

O155 R380

C537 Auctiones A.G., Basel, Auction 26 16-19 September 1996, 315; 16.30

O155 R386

C552 Aï Khanum II 1973, 28; 15.87

O168 R373

C522 Dr. Busso Peus Nachf., Auction 313 13 May 1985, 305; Holt 1981, 94; 15.86

O171 R387

C553 Aï Khanum II 1973, 29; 15.18

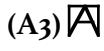
O183 R436

C661 Holt 1981, 96; n/a

Method	D_o	±	D_r	D_r/D_o	W
Carter	209.1	4.6	1037.2	5	2.46
Good	191.2		785	4.1	
Esty, 1986	219.5		1049.1	4.8	
Esty, 2011	240.9	16.2	1294.1	5.4	2.61

AR Drachms

Mint A

Group I (A3) 

Obv. Diademed head of king facing right. Dotted border.
Rev. Heracles seated on rock, holding club, resting on separate pile of rocks, in right hand.
ΒΑΣΙΛΕΩΣ ΕΥΘΥΔΗΜΟΥ.

O1 R1
C1 BM, 1993.1110.20; 3.08
O2 R2
C2 BM, 1956.0710.25; 3.80
O2 R16
C22 RC Senior Ltd, List 1 1981, 13; n/a
O20 R25
C35 Catalogue of Coins in the Panjab Museum, 6; 3.89
O21 R26
C36 Ashmolean, Hollis Collection, 5; 3.80

Mint B

Group II (B3)

Obv. As above.
Rev. As above.
Die axis: six o'clock.

O6 R5
C9 CNG, Triton XI 8th January 2008, 353; 4.12
O7 R6
C10 CNG, Electronic Auction 165 30th May 2007, 89; 3.85

O7 R17
C25 Ashmolean, H. De S. Shortt Bequest 1975; 3.74
O7 R22
C30 *SNG* ANS, 133; 3.90
O7 R24
C34 Sotiriadis Collection, (Svoronos 1913, pl. XVIII), 4; 3.52
O12 R12
C16 Fitzwilliam Museum Tremlett Bequest 1918, 3; n/a
O14 R14
C18 CNG, MBS 46 24 June 1998, 612; 3.73
O14 R20
C28 *SNG* ANS, 120; 3.97
O16 R14
C23 German Private Collection, 12; 3.8
O17 R18
C26 Ashmolean, J B Elliott 1859; 3.68
O18 R21
C29 *SNG* ANS, 121; 4.04
O23 R11
C15 Fitzwilliam Museum Tremlett Bequest 1918, 2; n/a

Group III (B6) 𐤍

Obv. As above.
Rev. As above.
Die axis: six o'clock

O5 R4
C7 CNG, Electronic Auction 225 13th January 2010, 189; 4.04
C19 CNG, MBS 51 15 September 1999, 692; 4.06
O5 R27
C37 Ashmolean, Hollis Collection; 3.52
O8 R7
C11 CNG, MBS 72 14th June 2006, 1021; 4.00
C24 Ashmolean, Oman 1947, 4; 3.98
O11 R10
C14 Peus, Auction 372 30th October 2002, 749; 3.84

Group IV (B16? Denomination labelled as 'hemidrachm') 𐤑

Obv. As above.
Rev. As above. Club resting on thigh.

O10 R9
C13 CNG, Electronic Auction 140 24th May 2006, 95; 4.03

O19 R9
C31 *SNG* ANS, 139; 3.94

Group V (B18)

Obv. As above.
Rev. As above. Club resting on thigh.

O3 R3
C3 BM, 1888.1210.79; 4.03
C4 *BNBact*, 17; 4.05
C5 CNG, Triton XVI 8th January 2013, 641; 4.05
C6 CNG, Electronic Auction 225 13th January 2010, 191; 3.67
C8 CNG, Electronic Auction 196 1st Oct 2008, 81; CNG, Electronic Auction 128 7th Dec 2005, 126; 3.97
C20 Kovacs, MBS V 31 August 1984, 186; n/a
C32 *SNG* ANS, 143; 3.94
O3 R19
C27 Ashmolean, Oman 1947; 3.83
O13 R13
C17 Münzen Auktion Essen, Auction 80 12/13 September 2000, 136; 4.00
O15 R15
C21 Drevnie monety Tadzhikistana, 46; 4.02
O15 R23
C33 *SNG* ANS, 144; 3.73

Method	D_o	±	D_r	D_r/D_o	W
Carter	36.4	6.3	74.4	2	0.85
Good	31.3		62.4	2	
Esty,1986	41.5		87.6	2.1	
Esty, 2011	45	23.7	93.6	2.1	0.87

AR Hemidrachms

Mint A

Group I (A4) no/illegible monogram

Obv. Diademed head of king facing right. Dotted border.
Rev. Heracles seated on rock, holding club, resting on separate pile of rocks, in right hand.
ΒΑΣΙΛΕΩΣ ΕΥΘΥΔΗΜΟΥ.

O1 R1
C1 BM, 1993.1110.19; 1.98
O1 R5
C5 *SNG* ANS, 134; 1.53
O2 R2
C2 BM, 1993.1110.23; 1.72
O3 R3
C3 BM, 1993.1110.24; 1.67
O4 R4
C4 BM, 1956.0710.26; 1.52
O5 R6
C6 *SNG* ANS, 135; 1.46
O6 R7
C7 CNG, Electronic Auction 270 14th December 2011, 151; 1.65
O7 R8
C8 Hess-Divo AG, Auction 317 27th October 2010, 318; 1.69
O9 R10
C10 Spink, Auction 8012 26th June 2008, 20; 1.60
O10 R11
C11 CNG, Electronic Auction 124 12th October 2005, 143; 1.79
O11 R12
C12 Spink, Auction 5014 28th September 2005, 205; 1.69
O13 R14
C14 Ashmolean, J B Elliott 1859; 1.48

Mint B

Group II (B16)

Obv. As above.
Rev. As above. Club resting on thigh.

O8 R9
C9 CNG, MBS 82 16th September 2009, 772; 2.04

O12 R13
C13 German Private Collection, 11; 1.8

AR Obols

Obv. As above.
Rev. As above.

Mint B

Group I (B20) no monogram

O1 R1
C1 BM, 1993.1110.22; 0.65
C2 *SNG* ANS, 140; 0.51
O1 R3
C4 CNG, Electronic Auction 213 1st July 2009, 192; 0.56
O2 R2
C3 *SNG* ANS, 145; 0.58
O2 R6
C10 Ashmolean, Hollis Collection; 0.58
O3 R1
C5 CNG, MBS 73 13th September 2006, 531; CNG, MBS 64 24th September 2003, 546; 0.59
O4 R4
C6 CNG, Auction 107 2nd February 2005, 124; 0.60
C8 Peus, Auction 345 1-3 November 1995, 310; 0.66
O5 R4
C7 Stephen Album Rare Coins, Auction 15 18th January 2013, 833; 0.41
O6 R5
C9 RC Senior Ltd, List 2 1981, 415; n/a

AR Hemiobols (no die analysis)

Mint B

Obv. As above.
Rev. As above. No monogram.

C1 BM, 1993.110.21; 0.27
C2 Ashmolean, Bought Spink June 1979; 0.15
C3 Ashmolean, Hollis Collection; 0.28
C4 CNG, Electronic Auction 215 29th July 2009, 323; 0.21
C5 Jean Elsen Auction 97 13th September 2008, 166; 0.28
C6 Jean Elsen Auction 94 15th December 2007; 0.28
C7 Gorny 56 7th October 1991, 354; 0.19
C8 P.-F. Jacquier List 16 Autumn 1994, 244; 0.19

C9 CNG MBS 45 18 March 1998, 752; 0.21
C10 Auctiones A.G., Basel Auction 8 27/28 June 1978, 384; 0.29

AE 'Double units'

Obv. Bearded head of Heracles facing right.
Rev. Prancing horse, right. ΒΑΣΙΛΕΩΣ ΕΥΘΥΔΗΜΟΥ.

Thick flan (no monogram), beveled edges

O1 R1
C1 BM, 1888.1210.81; 8.86
O1 R82
C84 CNG, MBS 38 6/7 June 1996, 485; 7.14
O1 R87
C90 Münzhandlung Schulten, Auction 12/13 April 1984, 115; 7.65
O2 R2
C2 BM, 1903.0102.1; 8.11
O2 R17
C17 *BNBact*, 19; 9.38
O2 R40
C41 *SNG* ANS, 162; 6.45
O3 R3
C3 BM, 1850.0305.1; 7.97
O3 R27
C28 Bibliothèque Royale de Belgique, Inv. 2004-22; 7.64
O3 R42
C43 *SNG* ANS, 164; 5.34
O4 R4
C4 BM, India Office Collection 4; 7.92
O4 R29
C30 *SNG* ANS, 148; 8.85
O5 R5
C5 BM, 1888.1210.80; 7.34
C23 *BNBact*, 25; 7.21
O5 R13
C13 Ashmolean, J B Elliott 1859; 8.13
O5 R23
C24 *BNBact*, 26; 7.06
O6 R6
C6 BM, 1894.0506.2390; 6.69
O7 R7
C7 BM, India Office Collection 3; 6.21
O11 R11
C11 Ashmolean, J B Elliott 1859; 8.39

O11 R91
C96 Spink, Auction 10 October 2002, 763; n/a
O12 R12
C12 Ashmolean, J B Elliott 1859; 9.26
O12 R36
C37 *SNG* ANS, 156; 7.48
O13 R14
C14 Ashmolean, J B Elliott 1859; 6.56
O14 R16
C16 *BNBact*, 18; 10.32
O14 R75
C77 CNG, Electronic Auction 56 8th January 2003, 43; 6.41
O15 R18
C18 *BNBact*, 20; 8.83
O16 R19
C19 *BNBact*, 21; 8.30
O17 R20
C20 *BNBact*, 22; 7.95
O18 R21
C21 *BNBact*, 23; 7.62
O19 R22
C22 *BNBact*, 24; 7.38
O20 R24
C25 *BNBact*, 27; 7.02
O20 R38
C39 *SNG* ANS, 160; 7.05
O23 R28
C29 *SNG* ANS, 147; 9.00
O23 R79
C81 CNG, MBS 57 4th April 2001, 717; 7.41
O23 R90
C95 Italo Vecchi Ltd London, Auction 8 4th December 1997, 148; 6.37
O24 R30
C31 *SNG* ANS, 149; 8.84
O24 R39
C40 *SNG* ANS, 161; 6.84
O24 R86
C89 Münz Zentrum, Auction 84 29/30 November 1995, 132; 9.07
O25 R31
C32 *SNG* ANS, 150; 8.77
O26 R32
C33 *SNG* ANS, 151; 8.54
O27 R33
C34 *SNG* ANS, 152; 8.33
O28 R34
C35 *SNG* ANS, 153; 7.99

O28 R35
C36 *SNG* ANS, 154; 7.91
O29 R37
C38 *SNG* ANS, 157; 7.41
O29 R49
C49 *SNG* Copenhagen, 257; 8.47
O30 R41
C42 *SNG* ANS, 163; 5.46
O31 R43
C44 *SNG* ANS, 165; 5.26
O31 R85
C88 Heinz W.-Müller, Auction 49 24/25 May 1985, 218; 7.75
O38 R55
C55 CNG, Electronic Auction 225 13th January 2010, 192; 7.41
O39 R56
C56 Auktionshaus H. D. Rauch GmbH, Auction 85 26th November 2009, 258; 8.51
O39 R89
C93 Münz Zentrum Rhineland, Auction 143 16/17 April 2008, 142; 6.96
O40 R57
C57 Auktionshaus H. D. Rauch GmbH, Summer Auction 17th September 2009, 392; 8.52
O41 R58
C58 CNG, Electronic Auction 215 29th July 2009, 198; 7.26
O42 R59
C60 CNG, Electronic Auction 165 30th May 2007, 90; 11.82
O47 R64
C65 CNG, Electronic Auction 139 10th May 2006, 147; 7.28
O48 R67
C68 Münzen & Medaillen Deutschland GmbH, Auction 17 4th October 2005, 1078; 8.44
O49 R68
C69 CNG, Triton VIII 11th January 2005, 624; 7.34
O53 R72
C74 Gorny & Mosch, Auction 130 8th March 2004, 1679; 7.09
O54 R73
C75 Gorny & Mosch, Auction 126 14th October 2003, 1504; 8.77
O56 R76
C78 CNG, Triton V 15th January 2002, 596; 8.47
O61 R84
C87 Pegasi, BBS 142 21 August 2012, 163; 7.49

Thin flan (none,  ,  , anchor + ΔI)

O8 R8
C8 BM, 1888.1210.106; 7.63
O8 R15
C15 Ashmolean, H. De S. Shortt Bequest 1975; 8.59

O8 R70
C91 Galerie Antiker Kunst, List 5 December 1987, 10; 8.49
O8 R88
C92 Münz Zentrum Rhineland, Auction 143 16/17 April 2008, 141; 7.89
O9 R9
C9 BM, 1860.1220.11; 7.37
O9 R52
C52 CNG, Electronic Auction 252 23rd March 2011, 198; 8.14
C59 CNG, Triton XI 8th January 2008, 355; 8.09
O10 R10
C10 BM, 1922.0424.2890; 6.74
O21 R25
C26 *BNBact*, 32; 6.87
O22 R26
C27 *BNBact*, 34; 8.46
O32 R44
C45 *SNG* ANS, 173; 7.84
O33 R45
C46 *SNG* ANS, 174; 7.28
O34 R47
C48 *SNG* ANS, 176; 6.62
C72 CNG, MBS 67 22nd September 2004, 1011; 8.02
O34 R48
C47 *SNG* ANS, 175; 8.11
O34 R54
C54 CNG, Electronic Auction 226 27th January 2010, 310; 8.43
O35 R50
C50 *SNG* Copenhagen, 258; 7.85
O36 R51
C51 CNG, Auction 87 18th May 2011, 730; 7.96
O36 R77
C85 CNG, MBS 41 19 March 1997, 961; 7.88
O37 R53
C53 Hess-Divo AG, Auction 317 27th October 2010, 316; 8.56
O37 R66
C67 Münzen & Medaillen Deutschland GmbH, Auction 17 4th October 2005, 1079; 8.11
O43 R60
C61 CNG, MBS 75 23rd May 2007, 618; 7.71
O43 R65
C66 CNG, Electronic Auction 124 12th October 2005, 148; 7.71
O43 R83
C86 Olympus Coins & Collectibles, FPL 20 Summer 1986, 25; n/a
C94 Glendining & Co. Ltd, Auction 11th December 1974, 151; n/a
O44 R61
C62 CNG, Electronic Auction 162 11th April 2007, 129; 7.72
O45 R62
C63 CNG, Electronic Auction 149 4th Oct 2006, 143; CNG, 124 12th Oct 2005, 147; 8.36

O46 R63
C64 Spink, Auction 6013 29th June 2006, 13; 8.07
O50 R69
C70 CNG, Electronic Auction 105 5th January 2005, 103; 8.11
O51 R70
C71 CNG, Electronic Auction 99 13th October 2004, 55; 6.31
O52 R71
C73 Künker, Auction 89 8th March 2004, 1533; 7.77
O55 R74
C76 CNG, Electronic Auction 58 12th February 2003, 67; 7.58
O57 R77
C79 CNG, MBS 58 19th September 2001, 854; 7.63
O58 R78
C80 CNG, MBS 57 4th April 2001, 718; 6.76
O59 R80
C82 P.-F. Jacquier, List 35 Summer 2007, 266; 7.01
O60 R81
C83 Tradart, Auction 8 November 1992, 136; 7.34

AE ‘units’

Obv. As above.
Rev. As above.

Thick flan (no monogram)

O3 R3
C3 *BNBact*, 31; 3.17

Thin flan (none,  , anchor ΔI, E)

O1 R1
C1 BM, 1888.1210.107; 4.16
O2 R2
C2 BM, India Office Collection 5; 3.82
O4 R4
C4 *SNG* ANS, 177; 3.92
O5 R5
C5 *SNG* ANS, 178; 5.07
O6 R6
C6 *SNG* ANS, 179; 2.95
O7 R7
C7 CNG, Electronic Auction 252 23rd March 2011, 197; 3.05
O8 R8
C8 CNG, Electronic Auction 155 3rd January 2007, 133; 4.58
O8 R9
C9 CNG, MBS 61 25th September 2002, 953; 3.97
O9 R10
C10 Münzhandlung Schulten, Auction 19-21 April 1989, 223; 3.51

AE ‘halves’ (no die analysis)

Obv. As above.
Rev. As above.

Thick flan (none)

C1 Ashmolean, unnumbered; 1.88
C2 *SNG* ANS, 166; 2.28
C3 *SNG* ANS, 167; 2.27
C4 *SNG* ANS, 168; 2.07
C5 *SNG* ANS, 169; 2.06
C6 *SNG* ANS, 170; 1.73
C7 *SNG* ANS, 171; 1.47

Thin flan ()

C8 Frank Sternberg Auction 23 29th October 2000, 320; Schweizerische Kreditanstalt Auction 2 27/28 April 1984, 306; 1.94

AE 'quarters'

Obv. As above.
Rev. As above.

Thick flan (none)

C1 *SNG* ANS, 172; 0.76
C2 Münzen & Medaillen Deutschland GmbH Auction 17 4th October 2005, 1080; 0.7

Demetrius I

AR Tetradrachms

Mint A

Group I ()

Obv. Diademed head of king facing right wearing elephant scalp (helmet?).
Rev. Heracles, standing facing, crowning himself with right hand, holding club and lion skin over left arm. ΒΑΣΙΛΕΩΣ / ΔΗΜΗΤΡΙΟΥ.

O17 R22
C23 *SNG* ANS, 186; Dr Jacob Hirsch, 4th May 1904, 468; J. Schulman, Auction 24 November 1913 (Collection de Mr Le Dr M.A. Kreling), 786; J. Schulman, Collection L. White September 1904, 955; 16.77
O17 R32
C38 HD Rauch, Auction 44, 12-14 February 1990, 227; 15.30
C59 Numismatica Genevensis SA, Auction 6 30th November 2010, 116; 16.13
O17 R47
C56 CNG, Triton XIV 4th January 2011, 421; CNG, MBS 51 15 September 1999, 696; 17.04
O17 R95
C113 CNG, MBS 57 4th April 2001, 720; 16.69
O17 R138
C191 A. Tkalec AG, 28 October 1994, 132; CNG, Triton II 1/2 December 1998, 580; 16.56
O17 R178
C276 Glendining & Co. Ltd, Auction 5th March 1980, 219; n/a
O36 R55
C65 Ira & Larry Goldberg, Auction 53 24th May 2009, 1711; Heritage, New York Signature Sale 3021 6th January 2013, 21281; 16.90
C203 CNG, MBS 32 7 December 1994, 225a; 16.96
O43 R77
C92 CNG, Triton VIII 11th January 2005, 625; CNG, MBS 38 6/7 June 1996, 486; 16.82
C247 CNG, Electronic Auction 299 27 March 2013, 238; 16.82
O63 R155
C229 Kovacs, MBS XIII 3 June 1998, 99; 16.39
O63 R185
C293 German Private Collection, 17; 17.1
O71 R129
C167 Gorny, Auction 102 24th May 2000, 345; 16.91
O71 R154
C228 Kovacs, MBS XII 30 November 1995, 149; 16.85
O71 R184
C292 German Private Collection, 16; 17.1

O72 R91
C108 Künker, Auction 67 9th October 2001, 520; Jean Elsen, Vente Publique 71 20th-21st September 2002, 367; Aretusa, Auction 4 22/23 March 1996, 328; Leu Numismatik, AG, Zürich Auction 74 19-21 October 1998, 277; 16.62

Group IIa (⌖)

Obv. As above.
Rev. As above.

O4 R4
C4 BM, 1856.1106.19; 16.75
O4 R46
C55 Ira & Larry Goldberg, Auction 62 1st Februay 2011, 3156; Gemini, LLC Auction V 6th January 2009, 664; Glendining & Co. Ltd, Auction 30th January 1997, 43; 16.85
C147 Thomas Høiland, Møntauktion 28th-30th April 2005, 531; n/a
O4 R62
C73 Ira & Larry Goldberg, Auction 42 23rd September 2007, 118; Lennox Gallery Ltd, FPL 3 September 1996, G184; 17.02
O4 R106
C130 Gorny & Mosch, Auction 134 11th October 2004, 1677; Gorny & Mosch, Auction 122 10th March 2003, 1552; 16.51
O4 R156
C230 Kovacs, MBS XIII 3 June 1998, 100; 16.53
O6 R6
C6 BM, India Office Collection 7; 14.26
O20 R4
C29 *SNG* ANS, 192; 15.99
O20 R50
C60 CNG, Auction 85 15th September 2010, 557; 16.86
O20 R97
C115 Heritage, CICF Signature Sale 3024 18th April 2013, 24712; 17.10
O20 R103
C254 CNG, Auction 94 18 September 2013, 831; 17.01
O31 R42
C51 ArtCoins Roma, Auction 3 31st May 2011, 114; 16.30
O42 R72
C85 CNG, MBS 70 21st September 2005, 458; 16.95
O42 R97
C246 CNG, Electronic Auction 299 27 March 2013, 240; 15.72
O42 R122
C154 Gorny, Auction 64 11th October 1993, 244; 16.96
O42 R136
C187 Schweizerische Kreditanstalt, Auction 2 27th April 1984, 308; 16.37
O42 R145
C205 CNG, MBS 34 6 May 1995, 228; 16.83

O64 R97
C249 CNG, Auction 93 22 May 2013, 679; 17.01
O67 R42
C159 Gorny, Auction 82 29th April 1997, 161; CNG, Triton I 2/3 December 1997, 609; 17.13
O67 R102
C123 Münzen & Medaillen Deutschland GmbH, Auction 34 26th May 2011, 188; 16.08
O67 R133
C182 Dr Jacob Hirsch, Auction 21 16th November 1908, 4414; 15.38
O75 R163
C250 CNG, Auction 93 22 May 2013, 678; 17.00

Group IIb (⏀)

Obv. As above.
Rev. As above.

O12 R16
C15 Qunduz Hoard, 26; 17.00
O12 R27
C31 Museum of Fine Arts, Boston, 2237; 16.17
O12 R111
C136 Gorny & Mosch, Auction 130 8th March 2004, 1681; 16.20
O12 R171
C261 Münzen & Medaillen AG Basel, Auction 85 11 April 1997, 141; 16.74
O25 R36
C44 CNG, Triton XIV 19th September 2012, 422; Hess-Divo AG, Auction 317 27th October 2010, 320; 16.71
O25 R52
C62 Stack's, Vermeule, Ward, and Mexico Maxico Collections 11th January 2010, 191; CNG, MBS 66 19th May 2004, 947; 17.06
C217 CNG, MBS 47 16 September 1998, 744; 16.62
O25 R100
C119 UBS Gold & Numismatics, Auction 56 28th January 2003, 171; Schweizerische Kreditanstalt, FPL 36 Winter 1981, 77; RC Senior Ltd, List 1 1981, 14; 15.93
C180 B. Ahlström, Auction 61 15th April 2000, 1466; n/a
O25 R103
C183 Peus, Auction 280 30th October 1972, 240; 16.72
C253 Sincona AG, Auction 10 27 May 2013, 191; 16.28
O25 R117
C149 Athena, Lagerliste 20, 112; 16.23
O25 R131
C245 CNG, Electronic Auction 298 13 March 2013, 80; 17.13
O39 R65
C76 Hess-Divo AG, Auction 307 7th June 2007, 1352; 16.74
O39 R111
C193 Antiqua, FPL 6 May 1998, 33; 16.90

O39 R119
C151 Bankhaus Aufhäuser, Auction 12 1-2 October 1996, 295; 16.87
O41 R68
C80 CNG, MBS 73 13th September 2006, 533; 17.04
O41 R70
C83 CNG, Electronic Auction 124 12th October 2005, 150; 16.95
O41 R76
C91 CNG, Triton VIII 11th January 2005, 626; Leu Numismatik, Auction 90 10th May 2004, 197; 16.88
C96 CNG, MBS 66 19th May 2004, 948; Gorny & Mosch, Auction 122 10th March 2003, 234; 16.86
O41 R103
C296 CNG, Triton II 1/2 December 1998, 582; 16.99
O41 R135
C186 Schweizerische Kreditanstalt, Auction 1 22nd April 1983, 158; 16.89
O41 R179
C280 Italo Vecchi Ltd London, Auction 5 5th March 1997, 311; 16.90
O49 R62
C279 Senior Consultants, List Undated, 5; n/a
O49 R65
C211 CNG, MBS 41 19 March 1997, 963; 16.40
O49 R96
C114 CNG, MBS 57 4th April 2001, 722; 16.76
C204 CNG, MBS 33 15 March 1995, 465; 16.77
O49 R123
C155 Gorny, Auction 69 18th November 1994, 470; Gorny, Auction 76 22nd April 1996, 278; Peus, Auction 345 1-3 November 1995, 316; 16.92
O51 R17
C16 Qunduz Hoard, 27; 16.71
O51 R51
C195 Berk, BBS 80, 18 January 1994, 282d; n/a
O51 R67
C79 CNG, Electronic Auction 150 18th October 2006, 179; CNG, MBS 67 22nd September 2004, 1014; 16.93
C291 Senior Consultants, List Summer 1999, 25; n/a
O51 R109
C133 Gorny & Mosch, Auction 130 8th March 2004, 1682; 16.20
O51 R143
C201 CNG, Auction 26 11 June 1993, 381; CNG, Auction 28 8 December 1993, 205; 16.87
O51 R189
C87 CNG, MBS 69 8th June 2005, 799; 16.90
O52 R68
C210 CNG, MBS 41 19 March 1997, 962; 16.82
O52 R103
C125 Numismatik Lanz München, Auction 149 24th June 2010, 275; 16.82
O62 R108
C244 Adolph Hess AG Luzern, Auction 31 6/7 December 1966, 558; 16.81

O62 R151
C222 CNG, MBS 49 17 March 1999, 841; 16.75

Group IIc (⌖)

Obv. As above.
Rev. As above.

O5 R5
C5 BM, 1888.1208.83; 16.75
C27 *SNG* ANS, 190; J. Schulman, Collection L. White September 1904, 956; 16.00
C192 A. Tkalec AG, 25 October 1996, 91; Leu Numismatik, AG, Zürich Auction 71 24 October 1997, 238; 16.89
C295 German Private Collection, 20; 15.3
O5 R56
C66 Ira & Larry Goldberg, Auction 53 24th May 2009, 1712; 15.70
O5 R98
C40 HD Rauch, Auction 63, 3-4th May 2000, 82; 16.59
O5 R104
C126 Gorny & Mosch, Auction 156 5th March 2007, 165; Gorny & Mosch, Auction 151 9th October 2006, 234; Gorny & Mosch, Auction 104 9th-10th October 2000, 496; Frank Sternberg Zürich, MBS 1 18th December 1999, 315; 16.78
C163 Gorny, Auction 96 7th June 1999, 270; 16.31
C287 Spink, Auction 125 3 March 1998, 87; 16.32
O7 R7
C7 Ashmolean, Hollis Collection 13; 16.04
O7 R26
C30 *SNG* Copenhagen, 259; 16.00
O7 R54
C64 Künker, Auction 158 28th September 2009, 356; Gorny, Auction 95 9th March 1999, 430; 15.50
O7 R58
C68 Comptoir Général Financier, MBS 34 30th April 2008, 301; Schweizerische Kreditanstalt, FPL 43 Sep. 1984, 70; 16.23
O7 R162
C248 ArtCoins Roma, Auction 7 20 May 2013, 287; 16.68
O56 R26
C28 *SNG* ANS, 191; Sotheby & Co., Haughton Collection 1st May 1958, 292; 16.00
C241 Auctiones A.G., Basel, Auction 5 2/3 December 1975, 230; 16.14
C283 Sotheby & Co., Haughton Collection 1st May 1958, 291; 16.64
O56 R54
C177 Numismatik Lanz München, Auction 64 7th June 1993, 331;16.75
C272 John Cummings Ltd, FPL (undated), G86; n/a
O56 R58
C169 Leo Hamburger, 12th June 1930; 15.42
C179 Antiquarius, Auction 43 6th December 1998, 33; n/a

O56 R105
C129 Gorny & Mosch, Auction 134 11th October 2004, 1676; Gorny & Mosch, Auction 122 10th March 2003, 1551; 16.49
C227 CNG, Triton III 30th November 1999, 688; 16.87
O56 R157
C233 Kovacs, MBS XVI 29 September 2004, 201; 16.74
O56 R174
C266 Artemide Aste, Auction 37, 8th December 2012, 63; 16.79
O56 R183
C289 Spink, Coinex Sale 8 October 2003, 134; 16.85

Group IId ()

Obv. As above.
Rev. As above.

O27 R38
C47 Roma Numismatics Ltd, Auction 3 31st March 2012, 352; 16.92
O27 R69
C82 CNG, Triton IX 10th January 2006, 1113; 16.89
O27 R121
C153 Gorny, Auction 15 17th December 1979, 100; Gorny, Auction 13 28-29th June 1979, 165; Gerhard Hirsch, 14-16th December 1976, 43; n/a
C232 Kovacs, MBS XV 1 October 2003, 176; 16.89
O27 R188
C116 Heritage, New York Signature Sale 3016 2nd January 2012, 23095; 16.92
O35 R51
C61 CNG, Electronic Auction 227 10th February 2010, 225; Gorny, Auction 97 11th October 1999, 605; 15.98
O35 R63
C74 Jean Elsen, Auction 93 15th September 2007, 537; 16.94
O35 R131
C174 Gerhard Hirsch, Auction 205 22-25 September 1999, 526; 16.05
O55 R108
C132 HD Rauch, Auction 73 17th May 2004, 364; 16.65
O55 R112
C137 Gorny & Mosch, Auction 126 14th October 2003, 1507; Gerhard Hirsch, Auction 188 22-24 November 1995, 410; Pegasi, MBS XIV 11 April 2006, 183; 16.56
C158 Gorny, Auction 81 3rd March 1997, 438; Gorny, Auction 84 13th October 1997, 5436; 16.83
C271 John Cummings Ltd, FPL May 1997, G147; n/a
O55 R142
C200 Classical Numismatic Auctions, Auction 21 26 June 1992, 187; Auctiones A.G., Basel, Auction 18 21/22 September 1989, 865; 16.60
O55 R148
C216 CNG, MBS 46 24 June 1998, 614; Senior Consultants, List February 1996, 6; 16.94

O55 R152
C224 CNG, MBS 51 15 September 1999, 697; 16.82
O55 R172
C263 Christie's London, Auction 9th October 1984, 23; n/a

Mint B

Group IIIa (ℙ,ℙ)

Obv. As above.
Rev. As above.

O2 R2
C2 BM, India Office Collection 6; 16.87
C208 CNG, Auction 40 4 December 1996, 1126; 16.55
O3 R3
C3 BM, 1870.0701.1; 16.80
O3 R9
C9 Ashmolean, Hollis Collection 15; 14.65
O3 R13
C12 *BNBact*, 2; 16.66
O3 R14
C13 *BNBact*, 3; 16.22
O3 R53
C63 Spink, Auction 9026 1st October 2009, 886; Spink, Auction 5020 30th September 2005, 561; Peus, Auction 345 1-3 November 1995, 317; Spink, Auction 13 October 1993, 44; 16.89
O3 R85
C102 CNG, Electronic Auction 75 15th October 2003, 46; 15.92
O3 R93
C110 CNG, MBS 58 19th September 2001, 863; 16.87
O3 R128
C166 Gorny, Auction 100 20th November 1999, 223; Gerhard Hirsch, Auction 191 24-28 September 1996, 759; Gerhard Hirsch, Auction 195 5-7 May 1997, 514; 16.96
O3 R141
C199 Ralph R. DeMarco, Jr Ancient Coins, MBS 2, 22 November 1996, 74; n/a
O10 R11
C10 *BNBact*, 1; 16.73
O10 R81
C274 Baldwin, Auction 19 4th May 1999, 50; Baldwin, Auction 31 14th/15th October 2002, 66; 16.91
O10 R86
C124 Hess-Divo AG, Auction 317 27th October 2010, 321; 16.73
O10 R118
C150 Bankhaus Aufhäuser, Auction 21-22 March 1995, 171; 16.10
O10 R169
C281 Sotheby, Wilkinson & Hodge, Charles Butler Collection Auction 10th July 1911, 183; n/a

O15 R20

C19 Qunduz Hoard, 30; 16.70

C213 CNG, MBS 45 18 March 1998, 745; 16.13

O15 R28

C32 *SNG* Salting Collection, 47; 16.92

O15 R45

C54 Jean Elsen, Auction 108 12th March 2011, 245; Münzen & Medaillen AG Basel, Auction 95 4th October 2004, 101; Jean Elsen, FPL 233 July-September 2005, 125; Jean Elsen, FPL 231 January-March 2005, 107; 16.75

O15 R169

C258 Bank Leu, Auction (Sammlung Walter Niggeler 1. Teil) 3-4 December 1965, 513; n/a

O16 R21

C20 Qunduz Hoard, 31; Morton & Eden, Auction 13th December 2005, 384; 17.02

C21 Qunduz Hoard, 32; 16.66

C22 Qunduz Hoard, 33; 16.59

O16 R115

C143 Jean Elsen, FPL 182 June-July 1996, 43; Jean Elsen, Vente Publique 50 14th June 1997, 345; 16.32

O18 R23

C24 *SNG* ANS, 187; 16.85

C45 Ira & Larry Goldberg, Auction 70 4th September 2012, 3150; 16.07

O18 R43

C127 Gorny & Mosch, Auction 151 9th October 2006, 235; Münz Zentrum, Auction 63 13 April 1988, 1473; Kirk Davis, BBS 51 Spring 2007, 55; 16.36

O18 R86

C103 CNG, Electronic Auction 72 3rd September 2003, 61; 16.25

O18 R170

C259 Bank Leu, AG Zürich Auction 13 29/30 April 1975, 322; 16.85

O18 R177

C275 Baldwin, Auction 33 6th/7th May 2003, 76; 16.58

O21 R21

C34 Colin E. Pitchfork Collection, 90; Dmitry Markov, MBS 10 23 October 2001, 204; CNG, MBS 69 8th June 2005, 798; 16.94

O21 R29

C262 Alpha Bank Numismatic Collection, 4101; 16.89

O21 R35

C42 Künker, Auction 216 8th October 2012, 550; 16.84

C181 B. Ahlström, Auction 63 28th April 2001, 1976; n/a

O21 R64

C75 CNG, Electronic Auction 170 8th August 2007, 139; 16.68

C142 HD Rauch, Auction 61 25th May 1998, 94; 16.78

C294 German Private Collection, 19; 17.0

O21 R81

C98 Künker, Auction 130 8th March 2004, 1536; Peus, Auction 311 31 October 1984, 467; Peus, Auction 315 28 April 1986, 303; 15.51

O21 R87

C104 CNG, Electronic Auction 59 26th February 2003, 83; 16.75

O22 R31

C37 Noble Numismatics, 3962; 16.72

C278 Senior Consultants, List Undated, 4; n/a

O22 R115

C240 Auctiones A.G., Basel, Auction 4 26/27 November 1974, 183; 16.85

O23 R33

C39 HD Rauch, Auction 63, 3-4th May 2000, 81; 15.62

O26 R33

C188 Schweizerischer Bankverein Zürich, Auction 33 20-22 September 1993, 442; 16.80

O26 R37

C46 CNG, Auction 90 23rd May 2012, 864; 16.93

C81 CNG, MBS 73 13th September 2006, 532; 16.68

O26 R45

C120 Baldwin's Auctions Ltd, The New York Sale IV 17th January 2002, 260; 16.89

O26 R60

C160 Gorny, Auction 87 2nd March 1998, 309; 16.86

O26 R71

C84 CNG, Electronic Auction 124 12th October 2005, 149; 16.59

O26 R90

C107 CNG, Triton V 15th January 2002, 1674; 16.82

O26 R92

C109 CNG, MBS 58 19th September 2001, 861; 16.64

C221 CNG, MBS 49 17 March 1999, 840; 16.93

O26 R168

C257 Aï Khanum II 1973, 43; 15.79

O28 R14

C239 Felix Schlessinger, 4 February 1935, 1524; 16.60

O28 R39

C48 Spink, Auction 12009 28th March 2012, 122; Sotheby's New York, Nelson Bunker Hunt Collection Auction 20 June 1991, 486; 16.22

C112 CNG, MBS 58 19th September 2001, 862; 16.80

O28 R40

C70 CNG, Electronic Auction 179 2nd January 2008, 117; 16.68

O28 R66

C78 CNG, MBS 75 23rd May 2007, 620; 16.99

O28 R78

C93 CNG, MBS 67 22nd September 2004, 1012; 16.40

O28 R84

C101 CNG, Electronic Auction 82 4th February 2004, 28; 16.26

O28 R124

C161 Gorny, Auction 89 5th May 1998, 291; 17.00

O28 R173

C264 Christie, Auction 9th October 1984, 24; Baldwin, Auction 14 13/14 October 1997, 38; Baldwin, Auction 31 14th/15th October 2002, 67; n/a

O28 R186

C89 Künker, Auction 97 7th March 2005, 998; Gorny, Auction 17 4-5th November 1980, 105; 15.80

O30 R20

C284 Sotheby & Co., Auction 3rd May 1984, 191; 16.10

O30 R41

C50 CNG, Electronic Auction 257 8th June 2011, 178; 16.44

C223 CNG, MBS 49 17 March 1999, 842; 16.67

O30 R60

C71 Spink, Auction 7023 27th September 2007, 107; 16.84

O30 R110

C135 Gorny & Mosch, Auction 130 8th March 2004, 1680; 16.67

O32 R20

C140 Gorny & Mosch, Auction 122 10th March 2003, 1550; 16.83

C156 Gorny, Auction 71 3rd May 1995, 461; 16.79

O32 R33

C237 Münz Zentrum, Auction 101 15-18 December 1997, 167; 15.60

O32 R43

C52 CNG, Electronic Auction 256 25th May 2011, 179; 16.84

O32 R126

C168 Gorny & Mosch, Auction 104 9th October 2000, 497; Gerhard Hirsch, Auction 205 22-25th September 1999, 527; 16.37

O34 R49

C58 Spink, Auction 1012 2nd December 2010, 1276; 16.57

O38 R19

C18 Qunduz Hoard, 29; 16.66

O38 R53

C215 CNG, MBS 45 18th March 1998, 756; 16.87

O38 R61

C72 Ira & Larry Goldberg, Auction 42 23rd September 2007, 117; CNG, MBS 72 14th June 2006, 1023; Gorny & Mosch, Auction 176 10th March 2009, 160; 16.82

O38 R124

C214 Classical Numismatic Auctions, MBS 45 18 March 1998, 755; 15.48

O44 R48

C57 CNG, Triton XIV 4th January 2011, 422; Senior Consultants, List Feb 1996, 7; 17.04

O44 R80

C95 CNG, MBS 66 19th May 2004, 946; 16.78

C118 NAC, Auction 39 16th May 2007, 83; CNG, MBS 46 24 June 1998, 615; 16.91

O44 R82

C99 Künker, Auction 130 8th March 2004, 1535; 16.33

C236 Münz Zentrum, Auction 39 16 April 1980, 729; Sammlung Köhler-Osbahr, 120; 16.34

O45 R83

C100 Künker, Auction 130 8th March 2004, 1537; Gorny, Auction 95 9th March 1999, 431; Pegasi, MBS XI 19 October 2004, 238; 15.66

C172 Gerhard Hirsch, Auction 212 22-24 November 2000, 435; 14.45

O45 R130

C173 Gerhard Hirsch, Auction 208 17-19th February 2000; 14.96

O45 R134

C185 Münzen Auktion Essen, Auction 75 6th May 1998, 289; 15.00

C194 Berk, BBS 80, 18 January 1994, 282c; NAC, Auction 23 19 March 2002, 1302; n/a

O45 R158

C234 Fred B. Shore, FPL 87 Feb 1999, 37; Pegasi, MBS X 5 May 2004, 221; 16.87

C268 Jesus Vico, S.A., Auction 108, 9 June 2005, 119; 17.00

O45 R176

C270 Schweizerische Kreditanstalt, Auction 7 27th April 1987, 307; 16.88

O46 R88

C105 CNG, 6th May 2002, 430; Leu Numismatik, AG, Zürich Auction 65 21-22 May 1996, 258; 16.93

O46 R180

C285 Sotheby & Co., Auction 27th March 1987, 474; n/a

O48 R94

C111 CNG, MBS 58 19th September 2001, 860; CNG, MBS 57 4th April 2001, 721; 17.00

O48 R161

C242 Auctiones A.G., Basel, Auction 7 7/8 June 1977, 337; 15.58

O54 R20

C190 Sotheby & Co. Zürich, 7th May 1975, 157; 16.39

C212 CNG, MBS 45 18 March 1998, 753; CNG, MBS 49 17 March 1999, 843; 16.27

O54 R60

C157 Gorny, Auction 78 13th June 1996, 308; Peus, Auction 337 3-9 November 1993, 249; 16.79

O54 R107

C131 HD Rauch, Auction 73 17th May 2004, 365; Baldwin, FPL Summer 2012, AG056; 15.87

O54 R116

C144 Jean Elsen, Vente Publique 70 15th June 2002, 376; 16.91

O54 R126

C164 Gorny, Auction 96 7th June 1999, 271; 16.97

C260 Leu Numismatik, AG, Zürich Auction 72 12 May 1998, 373; 16.94

O57 R29

C220 CNG, MBS 47 16 September 1998, 747; 16.68

O57 R90

C206 CNG, MBS 38 6/7 June 1996, 487; 16.28

O57 R125

C162 Gorny, Auction 92 20/21 November 1998, 351; Gorny, Auction 101 6th March 2000, 478; 15.42

C198 Berk, BBS 96, 18 June 1997, 179; n/a

O57 R137

C189 Schweizerischer Bankverein Zürich, Auction 33 20th September 1993, 443; Münz Zentrum, Auction 39 16 April 1980, 728; 16.45

O59 R132

C178 Numismatik Lanz München, Auction 74 20th November 1995, 298; 16.65

O65 R167

C256 Aï Khanum II 1973, 42; 15.54

C267 Jesus Vico, S.A., Auction 1st June 2000, 102; 16.80

O66 R71

C265 Artemide Aste, Auction/MBS 1st/15th September 2005, 94; 16.20

O68 R24

C25 *SNG* ANS, 188; 16.80

O68 R187

C122 Gerhard Hirsch Nachf., 22nd Sep 2011, 4109; Hirsch, Auction 181 22-25 Feb 1994, 443; 16.31

Group IIIb (☧,☧)

Obv. As above. Bead and reel border.
Rev. As above.

O8 R8

C8 Ashmolean, Hollis Collection 14; 16.50

C145 Fitzwilliam Museum; 16.51

C171 ANS, 1997.9.67; 16.41

C282 Sotheby & Co., Haughton Collection 1st May 1958, 290; 16.61

O19 R25

C26 *SNG* ANS, 189; Münz Zentrum, Auction 65 9 November 1988, 418; 16.73

C175 P.-F. Jacquier, FPL 17 Autumn 1995, 195; Senior Consultants, List February 1996, 8; CNG, Triton II 1/2 December 1998, 583; 16.90

O19 R30

C36 Calouste Gulbenkian Collection, 1063; 16.74

C138 Gorny & Mosch, Auction 126 14th October 2003, 1505; 16.85

O19 R79

C94 CNG, MBS 67 22nd September 2004, 1013; 16.23

O19 R165

C252 Sincona AG, Auction 10 27 May 2013, 192; 15.71

O29 R8

C146 Jean Elsen, Vente Publique 51 13th & 15th September 1997, 259; CNG, MBS 37 20 March 1996, 799; CNG, MBS 39 18 September 1996, 856; CNG, MBS 41 19 March 1997, 964; 16.76

O29 R40

C49 A. Tkalec AG, Auction February 2012, 29th February 2012, 106; 16.94

C97 CNG, MBS 66 19th May 2004, 945; 16.45

O29 R73

C128 Gorny & Mosch, Auction 146 6th March 2006, 284; 16.43

O29 R114

C141 Gorny & Mosch, Auction 122 10th March 2003, 235; 16.58

O29 R120

C152 Bankhaus Aufhäuser, Auction 13 7-8 October 1997, 253; Künker, Auction 43 29/30 September 1998, 196; H. Grün Heidelberger Münzhandlung, Auction 28 12th November 1999, 391; 16.93

O29 R144

C202 CNG, MBS 30 11 June 1994, 222; 16.89

O29 R149

C218 CNG, MBS 47 16 September 1998, 745; 16.81

O29 R150

C219 CNG, MBS 47 16 September 1998, 746; 16.38

O29 R159

C235 Spartan Numismatics, BBS 7 12 October 1998, 84; n/a

O29 R160

C238 Peus, Auction 323 1-4 November 1988, 1004; 16.15

O47 R34

C41 Künker, Auction 216, 8th October 2012, 549; Spink, Auction 6018 26th September 2006, 754; 16.83

O47 R75

C290 Tietjen & Co., Auction 104 17th December 2009, 236; 16.28

O47 R89

C106 Künker, Auction 71 12th March 2002, 472; 15.82

O47 R147

C209 CNG, Auction 40 4th December 1996, 1127; 16.72

O47 R166

C277 C.J. Martin (Coins) Ltd, Vol XX No. 3 August 1993, G92; n/a

O50 R40

C176 H H Kricheldorf Nachf., Auction 46 17th July 1998, 43; 16.42

O50 R99

C117 Gemini, LLC Auction V 6th January 2009, 400; 16.86

O60 R18

C17 Qunduz Hoard, 28; Gerhard Hirsch, Auction 212 22-24 November 2000, 436; 15.96

C33 *SNG* Lockett, 3351; Museum of Fine Arts, Boston, 309; Dr Jacob Hirsch, 6th May 1912, 510; 16.78

C43 Künker, Auction 216 8th October 2012, 548; Numismatik Lanz München, Auction 72 29th May 1995, 313; Peus, Auction 355 27-29 April 1998, 777; 16.88

O60 R44

C53 CNG, Auction 87 18th May 2011, 731; CNG, Auction 94 18 September 2013, 830; 16.39

C231 Kovacs, MBS XIV 16 October 1998, 83; 16.49

O60 R75

C90 CNG, Electronic Auction 107 2nd February 2005, 125; 16.86

O60 R89

C148 Claude Burgan Numismatique, Auction 15th June 1989, 373; 15.92

O60 R101

C121 Chaponnière & Hess-Divo, Auction 3 21st May 2012, 202; 16.69

C184 Münzen Auktion Essen, Auction 66 1st December 1993, 178; 16.92

O60 R113

C139 Gorny & Mosch, Auction 126 14th October 2003, 1506; 16.35

O60 R127

C165 Gorny, Auction 97 11th October 1999, 606; 16.06

O60 R140

C197 Berk, BBS 96, 18 June 1997, 178; n/a

O60 R153

C226 CNG, Triton III 30th November 1999, 687; 16.93

O60 R164

C251 CNG, Auction 93 22 May 2013, 677; 16.32

O60 R166
C255 Aï Khanum II 1973, 41; 15.81
O60 R182
C288 Spink, Coinex Sale 8 October 2003, 133; 16.75
O61 R30
C225 CNG, MBS 51 15 September 1999, 698; 16.96
C273 Baldwin, Summer Argentum Auction 25th May 2002, 15; Glendining & Co. Ltd, Auction 27th April 2000, 58; 16.45
O61 R146
C207 CNG, MBS 38 6/7 June 1996, 488; 16.30
O61 R181
C286 Sotheby & Co., Auction 24 April 1998, 323; 15.86
O69 R73
C86 CNG, MBS 70 21st September 2005, 457; 16.43

Unattributed mint(s)

Group IV (𐤍)

Obv. As above. Dotted border.
Rev. As above.

O74 R57
C77 CNG, MBS 75 23rd May 2007, 621; 16.55
C170 *SNG* ANS, 1996.61.1; 15.98
O76 R15
C14 *BNBact*, 4; 14.71
C243 Auctiones A.G., Basel, Auction 13 23/24 June 1983, 426; 16.27
O76 R57
C67 CNG, MBS 79 17th September 2008, 495; 16.22

Group V (𐤀)

Obv. As above.
Rev. As above.

O1 R1
C1 BM, 1888.1208.85; 14.64
C134 Gorny & Mosch, Auction 130 8th March 2004, 1683; Pegasi, MBS XIII 8 November 2005, 243; 16.73
O1 R139
C196 Berk, BBS 89, 14 February 1996, 198; n/a
O37 R59
C69 CNG, Electronic Auction 179 2nd January 2008, 116; 16.95

O73 R175

C269 UBS Gold & Numismatics, Auction 45 15th September 1998, 302; 15.90

Method	D_o	±	D_r	D_r/D_o	W
Carter	80.9	2.2	409.6	5.1	1.98
Good	68.8		299.4	4.4	
Esty, 1986	75.1		388.8	5.2	
Esty, 2011	85.2	7.6	509.3	6	2.07

AR Drachms

Obv. Diademed head of king facing right wearing elephant scalp (helmet?).
Rev. Heracles, standing facing, crowning himself with right hand, holding club and lion skin over left arm. ΒΑΣΙΛΕΩΣ / ΔΗΜΗΤΡΙΟΥ.

Group II ()

O5 R5
C6 CNG, Electronic Auction 74 17th September 2003, 41; 3.82

Group III ()

O1 R1
C1 BM, India Office Collection 8; 3.94
C5 CNG, MBS 75 23rd May 2007, 622; 3.83
O7 R7
C8 Gorny, Auction 76 22nd April 1996, 279; Gorny, Auction 81 3rd March 1997, 439; 4.17
O7 R12
C13 Senior Consultants, 22; n/a
O8 R8
C9 Gerhard Hirsch, Auction 196 24-27 September 1997, 475; 4.17
O9 R8
C14 Tom Cederlind, FPL 97 Winter 1993, 147; Tom Cederlind, FPL 98 Summer 1993, 154; n/a
O9 R9
C10 CNG, MBS 45 18 March 1998, 757; CNG, MBS 47 16 September 1998, 748; 4.10
O11 R11
C12 Senior Consultants, List February 1996, 9; n/a

Group IV ()

O3 R3
C3 *BNBact*, 6; 4.05
O4 R4
C4 *SNG* Copenhagen, 260; 4.05
O6 R6
C7 CNG, Electronic Auction 72 3rd September 2003, 62; 3.82
O10 R10
C11 Pegasi, MBS XVIII 1 April 2008, 188; 3.85

Group VI ()

O2 R2
C2 Ashmolean, Hollis Collection, 16; 3.52

AR Obols

Obv. Diademed head of king facing right wearing elephant scalp (helmet?). Dotted border.
Rev. Heracles, standing facing, crowning himself with right hand, holding club and lion skin over left arm. ΒΑΣΙΛΕΩΣ / ΔΗΜΗΤΡΙΟΥ.

Group I ()

O49 R63
C73 Pegasi, BBS 133 2 August 2005, 145; 0.86
O49 R64
C74 Münz Zentrum, Auction 82 6-8 September 1995, 249; 0.53
O50 R2
C2 BM, 1888.1208.88; 0.68
O51 R1
C1 BM, 1888.1208.89; 0.68
O52 R37
C41 CNG, Electronic Auction 107 2nd February 2005, 126; 0.66
O53 R73
C13 Ashmolean, H. De S. Shortt Bequest 1975; 0.57

Group II ()

O8 R8
C8 BM, 1859.0301.7; 0.66
C12 Ashmolean, Oman 1947; 0.70
C31 CNG, Electronic Auction 218 9th September 2009, 327; 0.64
O8 R24
C25 *SNG* ANS, 200; 0.46
O9 R9
C9 BM, 1888.1208.90; 0.54
O9 R34
C38 CNG, Electronic Auction 158 14th February 2007, 65; 0.66
O14 R16
C17 *BNBact*, 9; 0.68
O19 R27
C29 CNG, Electronic Auction 261 3rd August 2011, 167; 0.68
C33 CNG, Electronic Auction 213 1st July 2009, 193; 0.65
O20 R29
C32 CNG, Electronic Auction 217 26th August 2009, 199; 0.64
O20 R71
C81 Kirk Davis, BBS 16 2nd December 1996, 85; 0.60
O24 R33
C37 CNG, Electronic Auction 187 30th April 2008, 76; 0.64
C45 CNG, Electronic Auction 58 12th February 2003, 68; 0.69

O24 R42
C47 CNG, MBS 61 25th September 2002, 955; 0.68
O28 R40
C44 CNG, Electronic Auction 64 7th May 2003, 200; 0.68
O29 R41
C46 CNG, Electronic Auction 58 12th February 2003, 69; 0.67
C51 Gorny & Mosch, Auction 176 10th March 2009, 1424; 0.68
O33 R46
C53 Peus, Auction 371 25th April 2001, 407; 0.65
O41 R55
C63 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 309; 0.67
O41 R68
C78 Galerie Antiker Kunst, List 5 December 1987, 11; 0.70
O42 R58
C66 CNG, MBS 38 6/7 June 1996, 489; 0.62
O45 R66
C76 Peus, Auction 349 2 November 1996, 268; 0.72
O46 R67
C77 Felix Schlessinger, Auction 4 February 1935, 1525; 0.70
O47 R69
C79 Auctiones A.G. Basel, Auction 8 27/28 June 1978, 385; 0.67
O54 R23
C24 *SNG* ANS, 199; 0.67

Group III (☧)

O3 R3
C3 BM, 1888.1208.91; 0.68
O3 R18
C19 *SNG* ANS, 194; 0.68
O4 R4
C4 BM, India Office Collection 11; 0.68
O4 R11
C26 *SNG* Copenhagen, 261; 0.66
O4 R25
C27 *SNG* III Lockett Collection, 3352; 0.62
C57 ANS, 1999.30.31; 0.61
O4 R54
C62 Münzen Auktion Essen, Auction 72 4-6 December 1996, 200; 0.68
O5 R5
C5 BM, 1904.0407.20; 0.66
O5 R11
C11 Ashmolean, H. De S. Shortt Bequest 1975; 0.66
O5 R19
C20 *SNG* ANS, 195; 0.67

O6 R6
C6 BM, 1850.0412.121; 0.57
O7 R7
C7 BM, 1849.1122.2; 0.58
O10 R10
C10 Ashmolean, J B Elliott 1859; 0.68
O10 R56
C64 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 310; 0.68
O11 R13
C14 Ashmolean, Hollis Collection; 0.63
C48 CNG, MBS 61 25th September 2002, 954; 0.65
O11 R38
C42 CNG, Electronic Auction 91 9th June 2004, 89; 0.62
O11 R57
C65 CNG, MBS 37 20 March 1996, 800; 0.68
O12 R14
C15 *BNBact*, 7; 0.67
O12 R22
C23 *SNG* ANS, 198; 0.62
O13 R15
C16 *BNBact*, 8; 0.66
O13 R17
C18 *SNG* ANS, 193; 0.69
O13 R28
C30 CNG, Electronic Auction 246 15th December 2010, 183; 0.66
C72 Pegasi, MBS II 8 June 1996, 156; 0.67
O15 R20
C21 *SNG* ANS, 196; 0.66
O16 R21
C22 *SNG* ANS, 197; 0.64
O18 R26
C28 CNG, Auction 19th September 2012, 424; Jean Elsen, Auction 107 11th December 2010, 227; Jean Elsen, Auction 94 15th December 2007, 433; CNG, MBS 38 6/7 June 1996, 491; 0.70
O21 R30
C34 CNG, Electronic Auction 204 11th February 2009, 40; CNG, Electronic Auction 179 2nd January 2008, 118; 0.66
O22 R31
C35 CNG, Electronic Auction 187 30th April 2008, 74; 0.67
O23 R32
C36 CNG, Electronic Auction 187 30th April 2008, 75; 0.68
O25 R35
C39 CNG, Electronic Auction 149 4th October 2006, 144; CNG, Electronic Auction 122 7th September 2005, 173; 0.67
O26 R36
C40 CNG, Electronic Auction 133 15th February 2006, 110; 0.65
O26 R39
C43 Künker, Auction 130 8th March 2004, 1539; 0.67

O26 R59
C67 CNG, MBS 38 6/7 June 1996, 492; 0.70
O30 R43
C49 NAC, Auction 51 5th March 2009, 675; 0.68
O30 R61
C70 Brian Kritt, FPL 30 October 1996, 23; 0.70
O31 R44
C50 Gorny & Mosch, Auction 190 11th October 2010, 375; Tkalec, 25 October 1996, 92; 0.69
O31 R65
C75 Peus, Auction 345 1-3 November 1995, 318; 0.67
O31 R72
C82 German Private Collection, 24; 0.6
O32 R45
C52 Gorny & Mosch, Auction 142 10th October 2005, 179; 0.68
O32 R60
C69 CNG, MBS 45 18 March 1998, 758; 0.69
O34 R47
C54 Spink, Auction 4013 15th July 2004, 185; n/a
O35 R48
C55 Leo Hamburger, Auction 12th June 1930, 480; 0.65
O36 R49
C56 Adolph Hess Nachf., Auction 1st December 1931, 733; 0.64
O37 R50
C58 Kölner Münzkabinett, Auction 75 6/7 November 2001, 30; 0.58
O38 R51
C59 Antiquarius, Auction 37, March 1996, 26; n/a
O39 R52
C60 Adolph E. Cahn, Auction 60 2 July 1928, 1188; 0.64
O40 R53
C61 Adolph E. Cahn, Auction 80 27 February 1933, 435; 0.62
O43 R57
C68 CNG, MBS 38 6/7 June 1996, 493; 0.67
O43 R62
C71 Fred B. Shore, FPL 98 October 2001, 27; 0.68
O48 R70
C80 Kirk Davis, BBS 16 2nd December 1996, 84; 0.69

AE 'Double units'

Obv. Head of Heracles facing right with club over left shoulder.
Rev. Artemis standing facing with radiate head, bow in left hand, right arm raised.
ΒΑΣΙΛΕΩΣ / ΔΗΜΗΤΡΙΟΥ.

Group I ()

O4 R4
C4 BM, 1922.0424.2889; 8.34
C8 Ashmolean, H. De S. Shortt Bequest 1975; 9.84
O7 R4
C7 Ashmolean, Oman 1947; 7.77
O7 R21
C25 *SNG* Copenhagen, 262; 6.49
O7 R37
C47 Hess-Divo AG, Auction 317 27th October 2010, 324; 7.63
O7 R42
C54 Gerhard Hirsch, Auction 178 12-14 May 1993, 552; n/a
O8 R7
C9 Ashmolean, J B Elliott 1859; 6.89
O8 R35
C45 CNG, Triton V 15th January 2002, 597; 8.08
O8 R41
C52 Gorny, Auction 97 11th October 1999, 608; 8.02
O8 R46
C59 CNG, MBS 41 19 March 1997, 966; 8.13
O15 R16
C20 *SNG* ANS, 204; 4.26
O15 R49
C62 CNG, Triton III 30 November 1999, 689; 7.84
O23 R28
C35 CNG, Electronic Auction 129 21st December 2005, 180; 8.11
O23 R29
C38 CNG, Electronic Auction 103 8th December 2004, 99; 7.12
O25 R32
C42 CNG, MBS 63 21st May 2003, 933; 8.30
O26 R4
C58 CNG, MBS 38 6/7 June 1996, 494; 11.88[?]
O26 R33
C43 CNG, MBS 63 21st May 2003, 932; 8.28
O30 R53
C67 CNG, Electronic Auction 300 10 April 2013, 94; 7.68
O33 R57
C71 German Private Collection, 27; 5.2

Group II (☩)

O10 R9
C11 Ashmolean, H. De S. Shortt Bequest 1975; 7.50
O21 R23
C28 CNG, Electronic Auction 217 26th August 2009, 200; 7.99
O24 R30
C39 Künker, Auction 130 8th March 2004, 1541; Münzen Auktion Essen, Auction 72 4-6 December 1996, 201; 7.71

Group III (☧)

O3 R3
C3 BM, 1887.0605.6; 7.95
O3 R44
C56 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 312; 7.66
O11 R10
C12 Ashmolean, Hollis Collection; 7.53
O11 R27
C33 CNG, Electronic Auction 145 9th August 2006, 133; 8.21
O11 R45
C57 CNG, MBS 33 15 March 1995, 466; 8.37
O13 R11
C15 *BNBact*, 12; 7.62
C31 Künker, Auction 133 11th October 2007, 7784; 7.90
O13 R51
C65 Peus, Auction 313 13 May 1985, 306; 7.92
O14 R12
C16 *BNBact*, 13; 6.90
O14 R48
C61 CNG, MBS 49 17 March 1999, 844; 8.36
O16 R17
C21 *SNG* ANS, 205; 7.75
O20 R22
C26 Jean Elsen, Auction 106 11th September 2010, 244; 7.90
O28 R43
C55 Ciani, Supplément Commercial Arethuse 1, 1924, 692; n/a
O31 R54
C68 Münz Zentrum Rhineland, Auction 151 21 April 2009, 282; 8.00
O35 R24
C29 CNG, MBS 79 17th September 2008, 496; 7.57
O36 R10
C14 *BNBact*, 11; 8.30

Group IV (𓎛)

O29 R50
C64 Münz Zentrum, Auction 80 28-30th November 1994, 109; 7.34
O32 R55
C69 RC Senior Ltd, List 2 1981, 418; n/a

Group V (𓏲)

O5 R5
C5 BM, India Office Collection 12; 7.98
O6 R6
C6 BM, 1860.1220.14; 7.33
O6 R26
C32 CNG, Electronic Auction 150 18th October 2006, 180; 6.40
O9 R8
C10 Ashmolean, H. De S. Shortt Bequest 1975; 5.50
O17 R18
C22 *SNG* ANS, 206; 8.63
O18 R19
C23 *SNG* ANS, 207; 7.56
C36 CNG, MBS 69 8th June 2005, 800; 7.91
O22 R25
C30 Ponterio & Associates, Sale 146 - C.I.C.F. Auction 25th April 2008, 1317; CNG, Electronic Auction 176 14th November 2007, 91; H. D. Rauch, MBS 9 23rd September 2005, 266; 7.64

Group VI (𓌙)

O1 R1
C1 BM, 1888.1208.94; 8.29
O1 R2
C27 CNG, Electronic Auction 222 11th November 2009, 225; 6.90
O1 R13
C17 *SNG* ANS, 201; 8.40
O1 R14
C18 *SNG* ANS, 202; Glendining & Co. Ltd, Auction 11th December 1974, 152; 8.86
O1 R34
C44 CNG, Triton VI 14th January 2003, 532; 8.26
O1 R38
C48 Gorny & Mosch, Auction 142 10th October 2005, 1713; 5.43
O1 R40
C51 Gorny, Auction 96 7th June 1999, 272; 7.07
O1 R56
C70 RC Senior Ltd, List 4 1982, 52; n/a
O2 R2
C2 BM, 1888.1208.93; 7.60

O12 R1
C49 Gorny & Mosch, Auction 126 14th October 2003, 1508; 7.37
C63 Münz Zentrum, Auction 65 9 November 1988, 419; 6.82
O12 R2
C13 Ashmolean, Hollis Collection; 7.51
O12 R14
C40 CNG, Electronic Auction 75 1st October 2003, 46; 6.90
O12 R15
C19 *SNG* ANS, 203; 7.11
C34 CNG, Triton IX 10th January 2006, 1114; Spink, Auction 5014 28th Sep 2005, 209; 7.91
C37 CNG, Electronic Auction 110 16th March 2005, 67; 6.60
C53 Gorny, Auction 101 6th March 2000, 479; 7.07
O12 R31
C41 CNG, MBS 63 21st May 2003, 931; 6.60
O12 R36
C46 CNG, MBS 57 4th April 2001, 723; 7.25
O12 R47
C60 CNG, MBS 45 18 March 1998, 759; CNG, MBS 47 16 September 1998, 750; 6.54
O12 R52
C66 Peus, Auction 345 1-3 November 1995, 321; 8.40
O12 R59
C73 Catalogue of Coins in the Panjab Museum, 22; 8.16
O27 R39
C50 Gorny & Mosch, Auction 117 14th October 2002, 339; 6.40
O34 R58
C72 German Private Collection, 28; 6.1

Method	D_o	±	D_r	D_r/D_o	W
Carter	55.4	5.8	232.2	4.2	1.87
Good	49.4		189.8	3.8	
Esty, 1986	64.2		271.6	4.2	
Esty, 2008	68.1	22.1	298.3	4.4	2.02

AE 'Triple units'

Obv. Elephant head facing right, with bell around neck.
Rev. Caduceus. ΒΑΣΙΛΕΩΣ / ΔΗΜΗΤΡΙΟΥ.

Group II (⌖)

O1 R1
C1 BM, 1888.1208.96; 11.88

O1 R8
C10 *SNG* ANS, 209; 11.78
O1 R9
C11 *SNG* ANS, 210; 10.46
O1 R99
C128 Cayón Subastas, Auction 13th/14th December 2007, 3011; n/a
O2 R2
C2 BM, India Office Collection 13; 11.48
O3 R3
C3 Ashmolean, Oman 1947; 13.96
C7 *BNBact*, 15; 13.32
C9 Bibliothèque Royale de Belgique, Inv. VC 3; 12.48
O5 R5
C5 Ashmolean, Hollis Collection; 12.29
O5 R80
C102 Hess-Divo AG, Auction 320 26th October 2011, 263; 12.60
O7 R7
C8 *BNBact*, 16; 11.83
C59 CNG, Electronic Auction 184 19th March 2008, 77; 12.61
O8 R10
C12 *SNG* ANS, 211; 8.14
O8 R89
C112 Münzen & Medaillen Deutschland GmbH, Auction 17 4th October 2005, 1081; 11.73
O9 R11
C13 *SNG* Copenhagen, 263; 12.24
O12 R14
C16 CNG, Electronic Auction 283 25th July 2012, 150; 12.42
O12 R17
C32 CNG, Triton XIV 4th January 2011, 423; 11.83
O12 R18
C20 CNG, Electronic Auction 264 21st September 2011, 252; 12.88
O12 R20
C22 CNG, Electronic Auction 261 3rd August 2011, 168; 11.77
O12 R29
C31 CNG, Triton XIV 4th January 2011, 424; 11.34
O12 R32
C35 CNG, Electronic Auction 235 23rd June 2010, 303; 12.17
O12 R39
C43 CNG, Electronic Auction 207 25th March 2009, 244; 12.15
O12 R41
C45 CNG, Electronic Auction 204 11th February 2009, 41; Gorny & Mosch, Auction 180 12th October 2009, 238; Alpha Bank Numismatic Collection, 10454; 12.15
O12 R87
C109 Gorny & Mosch, Auction 159 8th October 2007, 257; 12.41
O14 R16
C18 Künker, Auction 204 12th March 2012, 373; 12.04

O15 R17
C19 CNG, Electronic Auction 268 16th November 2011, 156; 11.95
O15 R27
C29 CNG, Electronic Auction 249 9th February 2011, 231; 12.36
C40 CNG, Electronic Auction 222 11th November 2009, 226; 12.14
O15 R95
C121 Peus, Auction 301 25-27 May 1981, 560; 10.67
O16 R19
C21 CNG, Electronic Auction 262 17th August 2011, 179; 12.08
O18 R22
C24 CNG, Electronic Auction 259 6th July 2011, 178; 9.24
O18 R53
C60 CNG, MBS 76 12th September 2007, 937; 11.66
O19 R23
C25 CNG, Electronic Auction 254 20th April 2011, 154; 9.85
O19 R37
C41 CNG, Electronic Auction 215 29th July 2009, 324; 12.02
C65 CNG, Electronic Auction 165 30th May 2007, 93; 13.45
O19 R86
C108 Gorny & Mosch, Auction 169 12th October 2008, 151; 11.61
O20 R20
C64 CNG, Electronic Auction 166 13th June 2007, 86; 12.56
O20 R24
C26 CNG, Electronic Auction 253 6th April 2011, 212; 13.97
O20 R28
C30 CNG, Electronic Auction 248 26th January 2011, 241; 11.98
O21 R26
C28 CNG, Electronic Auction 250 23rd February 2011, 191; 12.34
O21 R55
C63 CNG, Electronic Auction 170 8th August 2007, 140; 12.22
O22 R30
C33 CNG, Electronic Auction 246 15th December 2010, 184; 12.33
O22 R46
C50 CNG, Electronic Auction 187 30th April 2008, 79; 12.07
O22 R58
C70 CNG, MBS 75 23rd May 2007, 623; CNG, Triton IX 10th January 2006, 1115; 11.86
C90 CNG, MBS 63 21st May 2003, 934; 10.43
O22 R81
C103 Gorny & Mosch, Auction 196 7th March 2011, 304; Hess-Divo AG, Auction 317 27th October 2010, 323; 11.98
O23 R31
C34 CNG, Electronic Auction 244 10th November 2010, 253; 12.54
O23 R51
C78 CNG, Electronic Auction 153 29th November 2006, 76; 10.90
O23 R59
C71 CNG, MBS 75 23rd May 2007, 624; 11.84

O23 R85
C107 Gorny & Mosch, Auction 170 13th October 2008, 1571; 11.02
O24 R33
C36 CNG, Electronic Auction 235 23rd June 2010, 304; 12.31
O24 R87
C119 CNG, MBS 47 16 September 1998, 749; 11.80
O24 R90
C113 P.-F. Jacquier, List 33 Winter 2005, 195; 12.29
O25 R35
C38 CNG, Electronic Auction 225 13th January 2010, 193; 10.35
O26 R36
C39 CNG, Electronic Auction 223 2nd December 2009, 261; 13.01
O27 R38
C42 CNG, Electronic Auction 209 22nd April 2009, 245; Ponterio & Associates, Sale 146 - C.I.C.F. Auction 25th April 2008, 1318; 11.30
O28 R40
C44 CNG, Electronic Auction 207 25th March 2009, 246; 11.72
O33 R47
C51 CNG, Electronic Auction 187 30th April 2008, 76; 12.35
C53 CNG, Electronic Auction 187 30th April 2008, 77; 12.58
O33 R49
C55 CNG, Electronic Auction 187 30th April 2008, 78; 12.92
C82 Spink, Auction 6013 29th June 2006, 14; 12.17
O33 R61
C115 Münzen Auktion Essen, Auction 90 21 June 2005, 160; 11.72
O34 R48
C52 CNG, Electronic Auction 187 30th April 2008, 80; 12.41
O34 R73
C91 CNG, Electronic Auction 62 9th April 2003, 47; 12.09
O35 R24
C97 CNG, MBS 58 19th September 2001, 865; 11.95
O35 R50
C56 CNG, Triton XI 8th January 2008, 356; 12.29
O35 R74
C92 CNG, Electronic Auction 59 26th February 2003, 84; 10.78
O35 R92
C117 Antiqua, FPL 15, 2009, 46; 12.50
O36 R51
C57 Auktionshaus Meister & Sonntag, Auction 5 19th September 2007, 87; 14.42
O36 R103
C132 Jesus Vico, S.A., Auction 115, 15 November 2007, 80; 11.20
O38 R60
C72 CNG, Electronic Auction 164 9th May 2007, 103; 12.49
O39 R61
C73 CNG, Electronic Auction 162 11th April 2007, 130; 11.98

O40 R19
C77 CNG, Electronic Auction 158 14th February 2007, 66; 12.19
O41 R68
C84 CNG, Electronic Auction 140 24th May 2006, 96; 12.24
O42 R69
C85 Jean Elsen, Auction 87 11th March 2006, 1257; 10.22
O42 R84
C106 Gorny & Mosch, Auction 170 13th October 2008, 1570; 11.02
O43 R70
C86 CNG, Electronic Auction 132 1st February 2006, 85; 11.88
O45 R75
C93 CNG, Electronic Auction 56 8th January 2003, 44; 11.87
O45 R79
C101 Heidelberger Münzhandlung, Auction 59 15th May 2012, 122; 8.98
O46 R78
C100 Westfälische Auktionsgesellschaft, Auction 62 17th September 2012, 580; 11.52
O47 R88
C110 Gorny & Mosch, Auction 156 5th March 2007, 166; 12.18
O52 R102
C131 Jesus Vico, S.A., Auction 113, 8 March 2007, 157; 11.90

Group III (☧)

O13 R15
C17 Künker, Auction 204 12th March 2012, 372; Künker, Auction 111 18th March 2006, 6337; 11.90
O13 R94
C120 Pegasi, MBS XXV 8 November 2011, 232; 11.72

Group IV (☧)

O11 R13
C15 CNG, Electronic Auction 288 10th October 2012, 270; CNG, Electronic Auction 265 5th October 2011, 230; CNG, Electronic Auction 255 4th May 2011, 149; 11.64
O11 R25
C27 Comptoir Général Financier, MBS 47 19th March 2011, 138; CNG, Electronic Auction 184 19th March 2008, 78; 11.46
C122 Peus, Auction 345 1-3 November 1995, 319; 11.39
O11 R43
C61 CNG, Electronic Auction 170 8th August 2007, 141; 12.25
O11 R54
C62 CNG, Electronic Auction 170 8th August 2007, 142; 12.19
O11 R57
C68 CNG, Electronic Auction 165 30th May 2007, 95; 11.84
C111 Gorny & Mosch, Auction 152 10th October 2006, 1547; 11.53
O11 R67
C83 CNG, MBS 72 14th June 2006, 1024; 11.93

O11 R93
C123 Peus, Auction 345 1-3 November 1995, 320; 11.72
O11 R100
C129 Cayón Subastas, Auction 13th/14th December 2007, 3012; n/a
O11 R104
C133 Italo Vecchi Ltd London, Auction 8 4th December 1997, 149; 9.72
O30 R43
C47 CNG, Electronic Auction 198 5th November 2008, 140; 11.34
O30 R93
C118 Antiqua, FPL 16, 2011, 66; 13.24
O55 R25
C54 CNG, Electronic Auction 187 30th April 2008, 81; 11.55

Group V ()

O4 R4
C4 Ashmolean, H. De S. Shortt Bequest 1975; 11.83
O4 R62
C74 CNG, Electronic Auction 160 14th March 2007, 111; 12.11
C87 Spink, Auction 5014 28th September 2005, 207; 11.49
C94 CNG, MBS 61 25th September 2002, 956; 10.43
O44 R62
C98 Gorny & Mosch, Auction 211 4th March 2013, 459; 11.75
O44 R72
C89 CNG, Electronic Auction 82 4th February 2004, 29; 11.26

Group VI ()

O6 R6
C6 *BNBact*, 14; 8.90
O10 R12
C14 Künker, Auction 226 11th March 2013, 622; Baldwin's Auctions Ltd, The New York Sale XX 7th January 2009, 340; Helios Numismatik, Auction 1 17th April 2008, 179; 10.45
O10 R21
C67 CNG, Electronic Auction 165 30th May 2007, 91; 14.36
C69 CNG, Electronic Auction 165 30th May 2007, 92; 11.76
O10 R34
C37 CNG, Electronic Auction 226 27th January 2010, 311; 11.51
C79 CNG, Electronic Auction 153 29th November 2006, 75; 12.08
C127 *Drevnie monety Tadzhikistana*, 60; 11.66
O10 R71
C88 Künker, Auction 130 8th March 2004, 1540; 10.94
O10 R76
C95 CNG, MBS 60 22nd May 2002, 1103; 10.16
C96 CNG, Triton V 15th January 2002, 598; 13.13

O10 R77
C99 Hess-Divo AG, Auction 321 25th October 2012, 187; 13.27
C116 Münzen Auktion Essen, Auction 90 21 June 2005, 161; 10.66
O10 R83
C105 Gorny & Mosch, Auction 176 10th March 2009, 161; n/a
O31 R44
C48 Künker, Auction 143 6th October 2008, 286; 11.54
O31 R63
C75 CNG, Electronic Auction 160 14th March 2007, 112; 11.77
O48 R96
C124 CNG, Auction 94 18 September 2013, 832; 10.59
O49 R97
C125 Münz Zentrum Rhineland, Auction 143 16/17 April 2008, 143; 10.70
O51 R101
C130 Jesus Vico, S.A., Auction 110, 9 March 2006, 133; 11.50
O53 R105
C134 Kirk Davis, BBS 50 Fall 2006, 91; Kirk Davis, BBS 51 Spring 2007, 56; 10.26
O56 R21
C23 CNG, Electronic Auction 260 20th July 2011, 318; 11.01

Group VII ( )

O29 R42
C46 CNG, Electronic Auction 198 5th November 2008, 141; CNG, Electronic Auction 190 25th June 2008, 148; 12.30
O29 R56
C66 CNG, Electronic Auction 165 30th May 2007, 94; 12.66
O29 R82
C104 Hess-Divo AG, Auction 317 27th October 2010, 322; 11.99
O32 R45
C49 CNG, Electronic Auction 187 30th April 2008, 82; 12.37
O32 R65
C80 CNG, Electronic Auction 150 18th October 2006, 181; 10.50
O37 R52
C58 CNG, Electronic Auction 184 19th March 2008, 79; 12.92
O37 R64
C76 CNG, Electronic Auction 158 14th February 2007, 67; 10.96
O37 R66
C81 CNG, Electronic Auction 144 26th July 2006, 161; 10.06
O37 R91
C114 P.-F. Jacquier, List 35 Summer 2007, 267; 10.84
O50 R98
C126 Münz Zentrum Rhineland, Auction 151 21 April 2009, 281; 12.70

Method	D_o	±	D_r	D_r/D_o	W
Carter	73.8	4.9	380.4	5.2	1.63
Good	65.8		270.6	4.1	
Esty, 1986	80.4		376.2	4.7	
Esty, 2011	90.5	18.2	485.2	5.4	1.72

AE 'Sextuple units'

Obv. Shield with gorgon head in centre.
Rev. Trident. $\overline{\overline{\Delta}}$ in left field. ΒΑΣΙΛΕΩΣ / ΔΗΜΗΤΡΙΟΥ.

O1 R1
C1 BM, 1922.0424.2911; 25.69
O2 R2
C2 BM, 1868.1243.2; 23.40

O3 R1
C3 BM, 1888.1208.95; 23.27
O3 R3
C4 Ashmolean, Oman 1947; 18.61
C6 Ashmolean, Hollis Collection; Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 311; 20.85
O4 R4
C5 Ashmolean, H. De S. Shortt Bequest 1975; 24.68
O5 R5
C7 *SNG* ANS, 213; 23.22
O6 R2
C9 Gorny, Auction 97 11th October 1999, 607; 24.15
O6 R5
C8 *SNG* ANS, 214; Sotheby & Co., Haughton Collection 1st May 1958, 295; 22.92
O7 R6
C10 German Private Collection, 31; 23.0

Euthydemus II

AR Tetradrachm

Obv. Diademed head of king facing right. Dotted border.
Rev. Heracles standing facing, wearing wreath, holding another wreath in outstretched right hand, carry club and lion skin in left arm. ΒΑΣΙΛΕΩΣ ΕΥΘΥΔΗΜΟΥ.

Group I ()

O3 R3
C3 BM, 1888.1208.98; 16.14
O3 R10
C11 *BNBact*, 6; 15.24
O3 R24
C27 Nomos AG, Auction 6 8th May 2012, 111; Nomos AG, Auction 2 18th May 2010, 143; 17.03
C71 Gorny & Mosch Giessener Münzhandlung, Auction 126 14th October 2003, 1509; 16.09
O3 R32
C37 CNG, Triton XIV 4th January 2011, 426; 17.04
O3 R39
C46 CNG, Electronic Auction 187 30th April 2008, 83; 16.82
C88 CNG, MBS 57 4th April 2001, 724; Kovacs, MBS XIV 16 October 1998, 202; 16.81
O3 R76
C129 CNG, MBS 34 6 May 1995, 229; CNG, MBS 46 24 June 1998, 617; 16.74
O6 R9
C10 *BNBact*, 5; 16.71
C74 CNG, MBS 63 21st May 2003, 937; 16.82
C147 Dr. Busso Peus Nachf., Auction 323 1-4 November 1988, 1005; 16.75
O6 R41
C50 CNG, Electronic Auction 170 8th August 2007, 143; 16.88
C118 B. Ahlström, Auction 62, 11-12 November 2000, 1900; n/a
O6 R49
C60 Qunduz Hoard, 21; 16.73
O6 R50
C61 Qunduz Hoard, 22; 16.07
O6 R58
C85 CNG, MBS 58 19th September 2001, 866; 16.76
C117 Numismatik Lanz München, Auction 86 18 May 1998, 220; 16.75
O6 R61
C81 Gorny & Mosch Giessener Münzhandlung, Auction 122 10th March 2003, 236; 16.80
O6 R64
C89 CNG, MBS 57 4th April 2001, 725; 16.86

O6 R65

C91 Numismatik Lanz München, Auction 97 22nd May 2000, 365; Jean Elsen, Vente Publique 67 15th September 2001, 313; Numismatik Lanz München, Auction 80 26 May 1997, 209; 16.13

C96 UBS Gold & Numismatics, Auction 56 28th January 2003, 172; NAC, Auction 23 19 March 2002, 1303; 16.76

O6 R90

C159 Alpha Bank Numismatic Collection, 7443; 16.33

O9 R13

C14 *SNG* ANS, 217; 16.20

C34 ArtCoins Roma, Auction 3 31st May 2011, 115; HD Rauch, Auction 73 17th May 2004, 367; 16.50

O9 R21

C24 HD Rauch, Auction 63 3-4 May 2004, 84; CNG, Electronic Auction 245 1st December 2010, 234; 16.54

C151 Gerhard Hirsch Nachf., Auction 289 2 May 2013, 478; 16.80

O9 R57

C73 Spink, Auction 3014 8th October 2003, 135; 16.65

O10 R58

C76 CNG, Electronic Auction 64 7th May 2003, 201; 16.04

O10 R92

C15 *SNG* ANS, 218; 14.28

O13 R18

C21 Dorotheum, Auction 489 10-12 May 1999, 32; Dorotheum, Auction 490 15-17 November 1999, 1013; 15.74

O14 R19

C22 Dorotheum, Auction 489 10-12 May 2000, 33; HD Rauch, Auction 61 25th May 1998, 95; n/a

O14 R27

C152 ArtCoins Roma, Auction 7 20 May 2013, 288; 14.65

O14 R34

C41 CNG, Triton XIII 5th January 2010, 1366; 16.70

C125 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 313; 16.02

O14 R42

C51 A. Tkalec AG, Auction 22nd April 2007, 114; CNG, Triton X 9th January 2007, 449; 16.84

O14 R48

C57 Künker, Auction 94 27th September 2004, 1523; Auctiones A.G., Basel, Auction 26 16-19 September 1996, 316; Auctiones A.G., Basel, Auction 29 12/13 June 2003, 774; Münzen und Medaillen AG Basel, Auction 85 11 April 1997, 142; 16.77

C153 Sincona AG, Auction 10 27 May 2013, 193; 15.97

O14 R63

C83 CNG, MBS 61 25th September 2002, 958; 16.82

O14 R66

C93 Heritage, New York Signature Sale 3021 6th January 2013, 21282; 16.76

O14 R81

C137 CNG, (Triton III) 30 November 1999, 690; 16.81

O14 R82

C138 Kovacs, MBS XII 30 November 1995, 150; 16.27

O15 R20

C23 HD Rauch, Auction 63 3-4 May 2004, 83; 16.41

O15 R21

C33 Stack's Bowers Galleries, 7th July 2011, 915; 15.46

O15 R35

C42 Ira and Larry Goldberg Coins and Collect, Auction 53 24th May 2009, 1713; 16.60

O15 R77

C130 CNG, MBS 37 20 March 1996, 805; 16.10

O15 R95

C162 Jesus Vico, S.A., Auction 1st June 2000, 103; 16.60

O15 R102

C86 CNG, MBS 58 19th September 2001, 867; 16.75

O18 R21

C59 CNG, MBS 67 22nd September 2004, 1016; Westmoreland Collection, 77; 16.76

O18 R30

C134 CNG, MBS 47 16 September 1998, 751; 15.93

O18 R96

C165 Italo Vecchi Ltd London, Auction 16 9th October 1999, 306; 16.05

O19 R27

C30 Künker, Auction 193 26th September 2011, 304; Qunduz Hoard, 23; 16.44

O19 R81

C176 German Private Collection, 33; 16.5

O19 R89

C156 Bank Leu AG Zürich, Auction 13 29/30 April 1975, 321; Leu Numismatik, Zürich Auction 72 12 May 1998, 374; 16.75

O19 R100

C169 Sotheby & Co., Auction 3rd May 1984, 192; 15.75

O21 R20

C78 Gorny & Mosch Giessener Münzhandlung, Auction 122 10th March 2003, 237; 16.71

O21 R21

C122 Münzen Auktion Essen, Auction 70 6-8 December 1995, 136; 16.82

O21 R30

C35 Jean Elsen, Auction 108 12th March 2011, 246; 16.69

C68 Künker, Auction 89 8th March 2004, 1543; Gorny, Auction 102 24th May 2000, 346; 15.10

C94 Gemini, LLC, Auction IX 9th January 2012, 682; Dix Noonan Webb, 2008 Coinex Auction 29th September 2008, 5657; 15.76

C123 Münzen Auktion Essen, Auction 75 6 May 1998, 290; 15.21

O21 R74

C124 Münzen Auktion Essen, Auction 80 12/13 September 2000, 137; 16.89

O21 R86

C143 Pegasi, BBS 139 17 August 2010, 155; 15.40

O21 R98

C175 German Private Collection, 32; 15.6

O21 R101

C111 Gerhard Hirsch Nachf., Auction 209 3-5 May 2000, 294; Gerhard Hirsch Nachf., Auction 206 24-26 November 1999, 277; 16.00

O27 R41

C119 H. Grün Heidelberger Münzhandlung, Auction 32 15/16 May 2001, 307; 15.26

O27 R61
C84 Leu Numismatik, Auction 83 6th May 2002, 431; Münzen und Medaillen AG Basel, Auction 79 28 February 1994, 421; 16.90
O27 R79
C135 CNG, MBS 49 17 March 1999, 845; 16.83
O27 R86
C172 Spink, Auction 13 October 1993, 45; 16.89
O28 R47
C56 Hess-Divo AG, Auction 299 27th October 2004, 112; 15.72
O28 R93
C131 CNG, MBS 37 20 March 1996, 806; 16.06
O31 R60
C79 Gorny & Mosch Giessener Münzhandlung, Auction 122 10th March 2003, 1556; 16.69
O31 R93
C177 CNG, Triton II 1/2 December 1998, 585; 16.84
O36 R27
C160 Artemide Asta, MBS XIX 14th December 2007, 1094; 14.52
O39 R97
C170 Sotheby & Co., Auction 17th April 1985, 386; n/a
O44 R26
C29 Noble Numismatics, Auction 98 22nd November 2011, 5138; 15.13
O44 R41
C49 CNG, MBS 76 12th September 2007, 938; 16.87

Group II (A)

O1 R1
C1 BM, 1993.1106.25; 15.03
O12 R17
C19 Ball State University Museum of Art, 2000.017.105; 16.56
O12 R31
C36 CNG, Triton XIV 4th January 2011, 425; Senior Consultants, List Autumn 1998, 6; 17.04
C150 Astarte, Auction 1 11 May 1998, 108; 16.84
O12 R53
C65 Leu Numismatik, Auction 90 10th May 2004, 198; 16.80
O12 R80
C136 CNG, MBS 51 15 September 1999, 699; 16.45

Group III (A)

O5 R6
C6 *BNBact*, 1; 16.30
O5 R59
C77 Gorny & Mosch Giessener Münzhandlung, Auction 122 10th March 2003, 1555; 16.50

Group IV (,)

O2 R2

C2 BM, OR 9678; 16.89
C92 Künker, Auction 226 11th March 2013, 623; 15.94
C116 Numismatik Lanz München, Auction 44 16 May 1988, 301; 16.68
C149 J. Schulman, Auction 5/6 June 1930 (Collection de L. Vierordt), 180; 16.68

O2 R5

C20 Calouste Gulbenkian Collection of Greek, 1064; Sotheby, Wilkinson & Hodge, Bunbury Collection Auction 7th December 1896, 657; 16.91

O2 R16

C17 Museum of Fine Arts, Boston, 2238; 16.89

O4 R5

C5 Ashmolean, Hollis Collection, 23; 16.37
C7 *BNBact*, 2; 16.90
C18 *SNG* III Lockett Collection, 3353; 16.35
C109 Jacob Hirsch, Auction 6th May 1912, 511; 16.35
C146 Münz Zentrum, Auction 86 11-13 September 1996, 110; Sotheby & Co., Auction 17th April 1985, 385; 15.70

O4 R8

C9 *BNBact*, 4; 15.04

O4 R16

C75 CNG, MBS 63 21st May 2003, 936; Westmoreland Collection, 78; 16.65

O4 R22

C25 Künker, Auction 216 8th October 2012, 551; Athena, Lagerliste 19, 1993, 85; 16.53

O4 R78

C133 CNG, Auction 40 4 December 1996, 1128; 16.54

O7 R4

C4 Ashmolean, J B Elliott 1859, 33; 13.42
C107 Dr Jacob Hirsch, Auction 27th November 1905, 584; 16.79
C120 Jacob Hirsch, Auction 8, 18 May 1903, 1335; n/a

O7 R11

C12 Bibliothèque Royale de Belgique, Coll. De Hirsch; 16.90
C102 Gorny, Auction 69 18th Nov 1994, 471; Gorny, Auction 78 13th June 1996, 309; 16.88

O7 R16

C157 NAC, Auction 2 21/22 Feb 1990, 238; Sotheby & Co., Haughton Collection 1st May 1958, 296; 16.92

O7 R99

C144 Spartan Numismatics, BBS 19 27 February 2001, 102; n/a

O8 R12

C13 *SNG* ANS, 216; 16.85
C38 Hess-Divo AG, Auction 317 27th October 2010, 325; 16.79
C87 Leu Numismatik, Auction 81 16th May 2001, 348; Schweizerische Kreditanstalt, Auction 7 27th April 1990, 308; 16.88
C166 J. Schulman, Collection L. White September 1904, 17; n/a

O8 R15

C108 Dr Jacob Hirsch, Auction 29th November 1909, 3137; Brüder Egger, Auction 11th May 1914, 2685; 16.71

O8 R40

C90 Numismatik Lanz München, Auction 97 22nd May 2000, 364; 16.86

O8 R55

C69 Gorny & Mosch Giessener Münzhandlung, Auction 130 8th March 2004, 1686; 15.43

O8 R103

C70 CNG, Electronic Auction 84 3rd March 2004, 94; 16.47

O11 R15

C16 *SNG* Copenhagen, 264; Münzhandlung Basel, Auction 10 16 March 1938, 395; 16.74

O17 R7

C8 *BNBact*, 3; 16.49

O17 R23

C26 CNG, Electronic Auction 279 16th May 2012, 145; Auctiones A.G., Basel, Auction 20 8/9 November 1990, 507; 16.34

O17 R25

C28 Spink, Auction 12009 28th March 2012, 123; Leu Numismatik, Zürich Auction 65 21-22 May 1996, 259; 16.93

C39 Numismatik Lanz München, Auction 149 24th June 2010, 276; 16.38

C58 CNG, MBS 67 22nd September 2004, 1015; 16.62

O17 R29

C32 CNG, Auction 88 14th September 2011, 591; CNG, Auction 85 15th September 2010, 558; 16.94

O17 R44

C53 CNG, Triton VIII 11th January 2005, 628; 16.88

C114 H H Kricheldorf Nachf., Auction 46 17 July 1998, 45; iNumis, Auction 4 9th November 2007; 15.40

O17 R56

C72 Gorny & Mosch Giessener Münzhandlung, Auction 126 14th October 2003, 1510; 16.10

C80 Gorny & Mosch Giessener Münzhandlung, Auction 122 10th March 2003, 1554; 15.97

C113 P.-F. Jacquier, List 21 Summer 1998, 229; P.-F. Jacquier, List 33 Winter 2005, 196; 16.96

C128 Berk, BBS 78, 8 September 1993, 274; n/a

O17 R68

C97 Baldwin's Auctions Ltd, Auction 26 9th May 2001, 1793; Baldwin, Auction 31 14th/15th October 2002, 68; 16.40

O17 R71

C106 Leo Hamburger, Auction 12th June 1930, 481; 16.30

O17 R75

C127 A. Tkalec AG, Auction 28 October 1994, 133; 16.91

O20 R28

C31 Gerhard Hirsch Nachf., Auction 275 22nd September 2011, 4110; Bank Leu AG Zürich, Auction 13 29/30 April 1975, 264; 16.74

O20 R70

C104 Gorny, Auction 95 9th March 1999, 432; 16.40

O22 R33

C40 Jean Elsen, Auction 104 13th March 2010, 130; Jean Elsen, Auction 95 15th March 2008, 76; Jean Elsen, Auction 94 15th December 2007, 654; Jean Elsen, Auction 93 15th September 2007, 538; 15.98

C99 Claude Burgan Numismatique, Auction 19th November 1988, 251; 15.60

C148 J. Schulman, Auction 24 November 1913 (Collection de Mr Le Dr M.A. Kreling), 789; 15.62

O22 R43

C52 Gorny & Mosch Giessener Münzhandlung, Auction 156 5th March 2007, 1569; 16.19

O22 R46

C55 CNG, Electronic Auction 100 27th October 2004, 79; 16.84

O23 R36

C101 Gorny, Auction 64 11th October 1993, 245; Gorny, Auction 71 3rd May 1995, 462; Gorny, Auction 84 13th October 1997, 5437; Dr. Busso Peus Nachf., Auction 345 1-3 November 1995, 323; 16.82

O23 R37

C44 Dr. Busso Peus Nachf., Auction 396 5th November 2008, 484; Gorny & Mosch Giessener Münzhandlung, Auction 122 10th March 2003, 1553; 16.32

O23 R38

C45 Gorny & Mosch Giessener Münzhandlung, Auction 169 12 October 2008, 152; 16.81

O23 R45

C54 CNG, Triton VIII 11th January 2005, 627; Gemini, LLC, Auction II 11th January 2006, 165; The Bru Sale, 18 November 2010, 49; Numismatica Genevensis, Auction 4 11/12 December 2006, 109; 16.82

O23 R46

C115 Künker, Auction 46 9/11 March 1999, 148; 16.91

O23 R69

C105 Gorny, Auction 100 20th November 1999, 1053; Gorny, Auction 101 6th March 2000, 480; 16.20

O24 R7

C47 Comptoir Général Financier, MBS 34 30th April 2008, 302; Numismatik Lanz München, Auction 117 24th November 2003, 433; 16.85

O24 R51

C145 The Numismatic Auction Ltd, "Ancient Coins" 3 1 December 1985, 172; 16.84

O24 R84

C141 Dmitry Markov, MBS 7 29/30 September 1999, 107; 16.86

O24 R85

C142 Pegasi, MBS XXI 24 November 2009, 196; 15.10

O24 R91

C154 CNG, Auction 94 18 September 2013, 833; 16.95

O25 R40

C48 CNG, Auction 179 2nd January 2008, 119; 16.79

O29 R52

C63 Qunduz Hoard, 25; 16.55

O29 R62

C82 Dr. Busso Peus Nachf., Auction 372 30th October 2002, 755; 16.82

C171 Sotheby & Co., Auction 24 April 1998, 324; 16.62

O30 R12

C168 Sotheby & Co., Auction 21st July 1983, 49; n/a

O30 R51

C62 Qunduz Hoard, 24; 15.73

O30 R54
C67 Gorny & Mosch Giessener Münzhandlung, Auction 130 8th March 2004, 1685; Jean Elsen, Vente Publique 76 13th September 2003, 240; Gorny, Auction 92 20/21 November 1998, 352; Gorny, Auction 97 11th October 1999, 609; 16.24

O30 R84
C163 John Cummings Ltd, FPL May 1997, G148; John Cummings Ltd, FPL (undated), G89; n/a

O32 R11
C126 Schweizerischer Bankverein Zürich, Auction 38 12-14 September 1995, 260; 16.90

O32 R67
C95 NAC, Auction 33 6th April 2006, 177; HD Rauch, Auction 73 17th May 2004, 366; 16.96
C103 Gorny, Auction 82 29th April 1997, 162; CNG, Triton II 1/2 December 1998, 584; 16.95

O33 R36
C43 Spink, Auction 9008 19th March 2009, 366; Senior Consultants, List February 1996, 12; 16.91

O33 R38
C139 Kovacs, MBS XIV 16 October 1998, 84; 16.57
C164 Glendining & Co. Ltd, Auction 28th July 1999, 42; 15.92

O33 R69
C98 Jean Elsen, Vente Publique 71 20th-21st September 2002, 368; Jean Elsen, Vente Publique 72 14th December 2002, 290; 16.84

O33 R73
C112 Gerhard Hirsch Nachf., Auction 208 17-19 February 2000, 1911; 15.98

O35 R72
C110 Gerhard Hirsch Nachf., Auction 209 3-5 May 2000, 293; Gerhard Hirsch Nachf., Auction 206 24-26 November 1999, 278; 15.90

O37 R2
C167 Sotheby & Co., Auction 22nd April 1970, 251; 16.63

O37 R5
C173 Brüder Egger, Auction 28th November 1904, 1639; 16.90

O37 R94
C161 Artemide Kunstauktionen, Auction 39, 30th November 2013, 88; 16.02

O38 R7
C121 Jacob Hirsch, Auction 21, 16 November 1908, 4416; 16.02

O41 R28
C66 Leu Numismatik, Auction 90 10th May 2004, 199; 16.90

O41 R88
C155 Aï Khanum II 1973, 44; 15.64

O42 R68
C132 CNG, MBS 38 6/7 June 1996, 495; 16.88

O43 R22
C100 Fraysse & Associés, Alain Weil 20th March 2003, 27; n/a

O45 R83
C140 Kovacs, MBS XIV 16 October 1998, 85; 16.33

Method	D_o	±	D_r	D_r/D_o	W
Carter	51	1.9	194.5	3.8	2.18
Good	43.8		152.8	3.5	
Esty, 1986	49.6		197.5	4	
Esty, 2011	53.6	6.4	240.7	4.5	2.29

AR Drachms

Obv. As above.
Rev. As above.

Group I ()

O1 R1
C1 BM, 1850.0412.120; 4.10
O2 R2
C2 BM, 1879.0401.10; 4.01
C9 *BNBact*, 8; 4.08
C20 CNG, MBS 38 6/7 June 1996, 496; CNG, MBS 41 19 March 1997, 967; 4.22
C21 CNG, Triton 1 2/3 December 1997, 610; CNG, MBS 51 15 September 1999, 700; Lennox Gallery, FPL 1 March 1996, G57; 4.20
O2 R5
C24 Peus, Auction 349 2 November 1996, 269; 4.10
O2 R10
C13 Künker, Auction 136 10th March 2008, 750; 3.46
O2 R13
C16 Baldwin's Auctions Ltd, Auction 37 4th May 2004, 783; 4.06
O2 R16
C22 Peus, Auction 343 26-28 April 1995, 307; 4.16
O2 R17
C23 Peus, Auction 345 1-3 November 1995, 324; 3.87
O2 R18
C25 Galerie Antiker Kunst, List 4 January 1987, 5; 3.81
O2 R19
C26 Auctiones A.G., Basel, Auction 5 2/3 December 1975, 229; Münzen und Medaillen AG Basel, Auction 79 28 February 1994, 422; 4.02
O2 R20
C28 Senior Consultants, List Feb 1996, 13; Senior Consultants, List Autumn 1998, 7; n/a
O4 R4
C4 Ashmolean, Oman 1947; 3.38
O5 R5
C5 Ashmolean, H. De Shortt Bequest; 4.07
C6 Ashmolean, Hollis Collection; 4.25

O5 R19

C29 Sotheby & Co., Haughton Collection 1st May 1958, 297; 4.05

O8 R8

C11 CNG, Electronic Auction 208 8th April 2009, 136; 4.02

O8 R12

C15 Künker, Auction 89 8th March 2004, 1544; Gorny, Auction 102 24th May 2000, 347; CNG, Triton I 2/3 December 1997, 611; 4.24

Group II (☧)

O6 R6

C7 Ashmolean, Hollis Collection; 3.97

C10 *SNG* ANS, 219; 4.10

O6 R9

C12 CNG, Electronic Auction 196 1st Oct 2008, 82; CNG, Triton IX 10th Jan 2006, 1116; 4.21

O6 R14

C17 Gorny, Auction 81 3rd March 1997, 440; Gorny, Auction 84 13th October 1997, 5438; 4.15

C27 Leu Numismatik AG, Zürich, Auction 65 21-22 May 1996, 260; 4.24

O6 R15

C18 Leo Hamburger, 12th June 1930, 482; 3.80

C19 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 314; 3.77

O6 R21

C30 Catalogue of Coins in the Panjab Museum, 28; 4.21

Group III (𐤀 ?)

O3 R3

C3 BM, 1888.1208.99; 4.28

O7 R7

C8 *BNBact*, 7; 3.84

O9 R11

C14 CNG, MBS 75 23rd May 2007, 625; 3.89

Method	D_o	±	D_r	D_r/D_o	W
Carter	11	1.3	55.8	5.1	1.22
Good	10.8		42	3.9	
Esty, 1986	13.8		57	4.1	
Esty, 2011	12.9	4.3	70	5.4	1.24

AR Hemidrachms

Obv. As above.
Rev. As above.

Group I ()

O1 R1
C1 BM, 1888.1208.100; 1.62
C2 Ashmolean, Hollis Collection; 2.02
C3 CNG Triton XVI, 8th January 2013, 642; 2.10

AR Obols

Obv. As above.
Rev. As above.

Group I ()

O3 R3
C3 Ashmolean, Bought Spink July/Aug 1976; 0.66
O4 R4
C4 Ashmolean, Hollis Collection; 0.66
C7 *SNG* ANS, 221; 0.65
O4 R8
C9 Gorny & Mosch, Auction 204 5th March 2012, 1653; 0.60
O4 R9
C10 CNG, Auction 88 14th September 2011, 592; 0.68

Group II ()

O1 R1
C1 BM, 1888.1208.101; 0.63
O5 R5
C5 *BNBact*, 9; 0.69
O5 R6
C6 *SNG* ANS, 220; Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 315; 0.67
O5 R15
C16 Gorny, Auction 102 24th May 2000, 348; 0.69
C21 NAC, Auction 4 27 February 1991, 162; 0.70
O5 R17
C18 CNG, MBS 37 20 March 1996, 807; 0.71
O5 R18
C20 Auctiones A.G., Basel, Auction 8 27/28 June 1978, 386; 0.70

O8 R11
C12 CNG, Electronic Auction 204 11th February 2009, 42; 0.65
O9 R12
C13 CNG, Electronic Auction 184 19th March 2008, 80; 0.67
O9 R14
C15 CNG, Electronic Auction 139 10th May 2006, 148; 0.55
C19 Peus, Auction 349 2 November 1996, 270; 0.70
O10 R13
C14 CNG, MBS 73 13th September 2006, 534; 0.60
O10 R16
C17 Gerhard Hirsch, Auction 187 19-23 September 1995, 770; Münz Zentrum, Auction 86 11-13 September 1996, 111; 0.66
O10 R19
C22 Lennox Gallery Ltd, FPL 3 September 1996, G185; n/a

Group III (A)

O2 R2
C2 BM, 1904.0407.21; 0.69
O6 R7
C8 *SNG* ANS, 222; 0.60
O7 R10
C11 CNG, Electronic Auction 215 29th July 2009, 201; 0.65

CuNi 'Double units'

Obv. Laureate head of Apollo facing right.
Rev. Tripod. ΒΑΣΙΛΕΩΣ ΕΥΘΥΔΗΜΟΥ.

Group I (Ⓐ)

O2 R2
C2 BM, 1922.0424.2888; 8.32
O5 R5
C5 Ashmolean, H. De S. Shortt Bequest 1975; Leo Hamburger, 12th June 1930, 483; 7.52
O7 R7
C7 *BNBact*, 10; 7.70
O8 R8
C8 *BNBact*, 12; 8.37
O10 R10
C10 *BNBact*, 14; 5.79
O12 R12
C12 *SNG* ANS, 224; 7.90
O14 R15
C15 Stack's Bowers Galleries, 7th July 2011, 921; 8.11

O14 R31
C31 Künker, Auction 89 8th March 2004, 1547; 7.01
O14 R32
C32 CNG, Electronic Auction 71 20th August 2003, 25; 8.25
O14 R36
C36 Gorny, Auction 97 11th October 1999, 610; Alpha Bank Numismatic Collection, 9921; 8.46
O16 R19
C19 CNG, Electronic Auction 215 29th July 2009, 203; 7.37
O16 R28
C28 CNG, MBS 69 8th June 2005, 801; 7.68
O18 R22
C22 CNG, Electronic Auction 166 13th June 2007, 87; 8.08
O18 R40
C40 CNG, MBS 37 20 March 1996, 809; 7.71
O20 R24
C24 Gorny & Mosch, Auction 156 5th March 2007, 1570; Gorny & Mosch, Auction 118 15th October 2002, 1555; 7.81
O21 R25
C25 CNG, Electronic Auction 155 3rd January 2007, 134; 7.17
O21 R29
C29 CNG, Electronic Auction 85 17th March 2004, 39; 8.05
O23 R27
C27 CNG, MBS 70 21st September 2005, 459; 7.35
O23 R38
C38 Gerhard Hirsch, Auction 184 23-25 November 1994, 443; n/a
O24 R30
C30 Gorny & Mosch, Auction 130 8th March 2004, 1687; 6.05
O25 R34
C34 CNG, MBS 57 4th April 2001, 728; 7.64
O26 R35
C35 CNG, MBS 57 4th April 2001, 727; 7.81
O29 R42
C42 CNG, MBS 38 6/7 June 1996, 497; 7.71
O30 R43
C43 CNG, MBS 38 6/7 June 1996, 498; 7.64
O32 R46
C47 German Private Collection, 13; 8.0
O33 R47
C48 German Private Collection, 36; 7.7

Group II ()

O3 R3
C3 BM, 1888.1208.102; 7.93
O3 R14
C14 *SNG* ANS, 226; 7.49

O4 R4
C4 BM, 1857.0813.2; 7.61
O4 R33
C33 CNG, MBS 60 22nd May 2002, 1105; 8.01
O4 R41
C41 CNG, MBS 37 20 March 1996, 810; 7.21
O6 R6
C6 Ashmolean, Hollis Collection; 7.52
O9 R9
C9 *BNBact*, 13; 7.05
O9 R45
C45 Galerie Antiker Kunst, List 5 December 1987, 13; 7.32
O13 R13
C13 *SNG* ANS, 225; 7.93
O13 R16
C16 Hess-Divo AG, Auction 317 27th October 2010, 326; 7.92
O13 R21
C21 CNG, Electronic Auction 201 17th December 2008, 168; 7.68
O22 R26
C26 CNG, Electronic Auction 150 18th October 2006, 183; 7.97
O27 R37
C37 Gerhard Hirsch, Auction 185 15-18 February 1995, 516; Gerhard Hirsch, Auction 191 24-28 September 1996, 760; n/a
O28 R39
C39 CNG, MBS 37 20 March 1996, 808; 8.43
O28 R45
C46 Münz Zentrum Rhineland, Auction 143 16/17 April 2008, 144; 7.96
O31 R44
C44 Münz Zentrum, Auction 84 29/30 November 1995, 133; 7.46

Group III (☧)

O1 R1
C1 BM, 1888.1208.103; 7.96
O11 R11
C11 *SNG* ANS, 223; 7.25
O11 R17
C17 Auktionshaus H. D. Rauch GmbH, Auction 86 12th May 2010, 424; CNG, MBS 57 4th April 2001, 726; 7.37
O15 R18
C18 CNG, Electronic Auction 215 29th July 2009, 202; 6.28
O17 R20
C20 CNG, Electronic Auction 208 8th April 2009, 137; CNG, Electronic Auction 150 18th October 2006, 182; 7.69
O19 R23
C23 CNG, Electronic Auction 162 11th April 2007, 131; 6.98

CuNi 'Units'

Obv. As above.
Rev. As above.

Group I (⌖)

O1 R1
C1 Ashmolean, Hollis Collection; Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 316; 3.54
C7 CNG, MBS 37 20 March 1996, 811; 3.57
O2 R2
C2 *SNG* ANS, 227; 1.80
C6 CNG, MBS 57 4th April 2001, 729; 1.42
O2 R3
C4 CNG, Electronic Auction 72 3rd September 2003, 63; 3.73
O3 R1
C3 CNG, Electronic Auction 78 26th November 2003, 63; 3.65
O4 R4
C5 CNG, MBS 60 22nd May 2002, 1106; 3.61

AE 'Triple units'

Obv. As above.
Rev. As above.

Group I (⌖)

O1 R1
C1 BM, 1888.1208.105; 11.73
O1 R11
C12 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 317; 11.00
O2 R2
C2 BM, 1860.1220.12; 10.36
O2 R4
C4 Ashmolean, Hollis Collection; 11.77
O2 R5
C5 *SNG* ANS, 228; 12.11
C17 Gorny & Mosch, Auction 142 10th October 2005, 1714; 11.10
O2 R6
C7 CNG, Electronic Auction 215 29th July 2009, 204; 10.92
O2 R9
C10 CNG, Electronic Auction 58 12th February 2003, 71; 11.93
O2 R10
C11 Fitzwilliam Museum, McClean Bequest 9688; 12.79

O2 R13

C14 Münz Zentrum Rhineland, Auction 156 1 September 2010, 242; Auktionshaus H. D. Rauch GmbH, Summer Auction 15th September 2008, 235; 10.28

O2 R14

C15 German Private Collection, 34; 11.5

O2 R15

C16 Catalogue of Coins in the Panjab Museum, 32; 10.37

O2 R16

C18 Künker, Auction 89 8th March 2004, 1545; 11.23

O3 R3

C3 Ashmolean, H. De S. Shortt Bequest 1975; 10.58

C6 *SNG* ANS, 229; 6.20; *halved coin*

O3 R7

C8 Künker, Auction 89 8th March 2004, 1546; 10.65

O3 R8

C9 CNG, Electronic Auction 58 12th February 2003, 70; 11.65

O3 R12

C13 CNG, MBS 39 18 September 1996, 854; 11.88

Method	D_o	±	D_r	D_r/D_o	W
Carter	3.4	0.3	106.7	31.4	0.98
Good	3		72	24	
Esty, 1986	3		103.5	34.5	
Esty, 2011	3.6	1.1	144	40	0.98

Pantaleon

AR Tetradrachms

Obv. Diademed head of the king facing right. Dotted border.
Rev. Zeus seated on throne holding pointed sceptre in left hand, Hecate with two torches on outstretched right hand. ΒΑΣΙΛΕΩΣ ΠΑΝΤΑΛΕΟΝΤΟΣ.

Group I ()

O1 R1

C1 BM, 1888.1208.108; 15.02

C2 Ashmolean, Hollis Collection 31; 15.82

C4 NAC, Auction 77 26th May 2014, 107; 16.07

O1 R3

C5 CNG, Triton II 1/2 December 1998, 594; Tkalec, Auction 28 October 1994, 135; 16.36

O2 R2

C3 Alpha Bank Numismatic Collection, 9349; 16.57

Method	D_o	±	D_r	D_r/D_o	W
Carter	2.7	1.2	6.1	2.3	0.67
Good	2.5		5	2	
Esty, 1986	3.1		6.7	2.2	
Esty, 2011	3.3	11.6	7.5	2.3	0.65

AR Drachms

Obv. As above.
Rev. As above.

Group I (⌖)

O1 R1

C1 BM, 1922.0424.108; 3.89

AR Obols

Group I ()

Obv. As above.
Rev. As above.

O1 R1
C1 BM, 1904.0407.22; 0.59

CuNi 'Double units'

Obv. Head of Dionysus facing right, wearing wreath with thyrsus over right shoulder.
Rev. Panther standing right with paw raised at vine. ΒΑΣΙΛΕΩΣ ΠΑΝΤΑΛΕΟΝΤΟΣ

Group I ()

O3 R6
C6 BM, 1888.1208.109; 7.49
O4 R7
C7 BM, 1859.0301.2; 7.05
O5 R8
C8 *BNBact*, 1; 8.01
O6 R9
C9 *SNG* ANS, 262; 6.23
O7 R10
C10 Spink, Auction 3014 8th October 2003, 140; 7.77
O8 R12
C12 CNG, MBS 72 14th June 2006, 1032; 8.03
O9 R13
C13 Berk, BBS 90, 17 April 1996, 184; n/a
O10 R5
C5 Alpha Bank Numismatic Collection, 9347; 8.24

AE 'Double units'

Obv. As above.
Rev. As above.

Group I ()

O1 R1
C1 BM, 1881.0707.1; 8.22
O1 R4

C4 *SNG* ANS, 264; 7.70

O1 R11

C11 Gorny & Mosch, Auction 126 14th October 2003, 1513; 6.36

O2 R2

C2 BM, 1888.1208.110; 7.87

O2 R3

C3 *SNG* ANS, 263; 7.94

AE Square, unknown denomination

Obv. Female (deity?) moving to left, holding flower in right hand. In Brahmi script *Rajane Patalevasa.*

Rev. Lion standing right. ΒΑΣΙΛΕΩΣ ΠΑΝΤΑΛΕΟΝΤΟΣ.

Group I (no monogram)

O1 R1

C1 BM, 1906.1103.2350; 13.16

O1 R6

C8 *BNBact*, 2; 12.61

O1 R16

C21 CNG, Triton V 15th January 2002, 1677; 10.23

O2 R1

C2 BM, 1857.0813.31; 12.67

C13 *SNG* ANS, 266; 12.30

O2 R2

C3 BM, 1859.0301.3; 12.55

C32 Fitzwilliam Museum, India Office 1906, Masson Collection; 11.07

O2 R3

C4 BM, 1894.0506.1922; 12.25

C18 *SNG* ANS, 271; 10.70

O2 R5

C7 BM, India Office Collection 14; 11.23

O2 R7

C9 *BNBact*, 3; 12.39

C19 *SNG* ANS, 272; 9.94

O2 R10

C12 *SNG* ANS, 265; 12.37

O3 R2

C6 BM, 1889.0105.1044; 11.28

O3 R4

C5 BM, 1894.0506.755; 11.69

O3 R9

C11 *BNBact*, 6; 11.27

O3 R11

C14 *SNG* ANS, 267; 12.21

O3 R20
C25 CNG, Electronic Auction 140 24th May 2006, 97; 12.11
O4 R8
C10 *BNBact*, 4; 12.11
O5 R12
C15 *SNG* ANS, 268; 11.83
O6 R13
C16 *SNG* ANS, 269; 11.22
O7 R14
C17 *SNG* ANS, 270; 10.95
O8 R15
C20 *SNG* ANS, 273; 7.30
O8 R22
C30 CNG, Electronic Auction 243 27th October 2010, 193; 10.77
O9 R17
C22 Gorny and Mosch, Auction 126 14th October 2003, 1514; 11.55
O10 R18
C23 Gorny and Mosch, Auction 142 10th October 2005, 1715; 11.82
O11 R19
C24 CNG, Electronic Auction 124 12th October 2005, 151; 11.62
O11 R22
C33 Todywalla's Auctions, Auction 47 25 September 2010, 17; 11.37
O12 R21
C26 Jean Elsen, Auction 89 9th September 2006, 884; 12.71
O13 R10
C27 CNG, Electronic Auction 149 4th October 2006, 148; 12.04
O14 R2
C28 CNG, Electronic Auction 201 17th December 2008, 169; 12.11
O15 R16
C29 CNG, MBS 84 5th May 2010, 785; 12.48
O16 R23
C31 Fitzwilliam Museum, T.55-1918; 12.54
O16 R24
C34 German Private Collection; 12.4

Method	D_o	±	D_r	D_r/D_o	W
Carter	24.6	3.7	65	2.6	2.59
Good	22.7		48	2.1	
Esty, 1986	29.8		65	2.2	
Esty, 2011	30.2	13.8	81.6	2.7	2.79

Agathocles

AR Tetradrachms

Series I Group I ()

Obv. Diademed head of king facing right.
Rev. Zeus standing facing holding pointed sceptre in left hand, Hecate with two torches on outstretched right hand. ΒΑΣΙΛΕΩΣ ΑΓΑΘΟΚΛΕΟΥΣ.

O1 R1
C1 American Numismatic Society, 1997.9.188; 16.51
C81 Gorny & Mosch, 10th March 2003, 1557; 16.50
C107 *SNG* ANS, 230; Ariadne Galleries, Auction 7 December 1982, 175; Felix Schlessinger, 4 February 1935, 1526; Bank Leu AG Zürich, Auction 28 5/6 May 1981, 209; 16.15
C118 BM, 1924.1017.1; 16.62
O1 R7
C7 CNG, 7th April 2001, 731; 16.49
C20 CNG, 11th January 2005, 630; 16.85
C56 CNG, 15th September 2010, 559; 16.79
C153 CNG, MBS 46 24 June 1998, 618; 16.92
C154 CNG, MBS 47 16 September 1998, 752; 16.47
O1 R10
C10 CNG, 15th January 2002, 1675; 16.89
O1 R18
C21 CNG, 11th January 2005, 631; 16.90
C87 Gorny & Mosch, 6th March 2006, 285; 16.80
C144 Münzen Auktion Essen, Auction 75 6 May 1998, 297; 15.56
O1 R42
C49 CNG, 8th January 2008, 357; Gorny & Mosch, 12th October 2009, 239; 16.81
O1 R45
C57 CNG, 5th May 2010, 784; Roma Numismatics Ltd, 31st March 2012, 354; 16.99
C171 Peus, Auction 313 13 May 1985, 308; 15.97
O1 R49
C67 Künker, 8th March 2004, 1549; 15.28
C168 Kovacs, MBS XVI 29 September 2004, 203; Pegasi, MBS VII 15 October 2002, 224; 15.10
O1 R50
C68 Künker, 8th March 2004, 1550; Selections from the Colin E. Pitchfork, 92; 16.51
C137 Gorny, Auction 100 20 November 1999, 1054; 16.70
O1 R59
C150 CNG, MBS 41 19 March 1997, 973; 16.30
O1 R86
C145 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 324; Spink, Coinex Sale 8 October 2003, 136; 16.79
O3 R3
C3 *BNBact*, 1; 16.45

O3 R47
C64 Peus, 23rd April 2003, 193; 16.84
C189 Alpha Bank Numismatic Collection, 4117; 16.80
O3 R59
C86 Gorny & Mosch, 8th March 2004, 1690; 16.40
O3 R86
C180 Auctiones A.G., Basel, Auction 7 7/8 June 1977, 338; 16.03
O6 R6
C6 CNG, 4th April 2001, 730; 16.66
C62 CNG, 22nd May 2013, 681; 16.60
O6 R40
C47 CNG, 12th September 2007, 940; 16.80
C60 CNG, 23rd May 2012, 865; Dmitry Markov, MBS 7 29/30 September 1999, 108; 16.22
O6 R46
C63 Peus, 29th October 2000, 289; 16.69
O6 R62
C92 H.D. Rauch, 3-4th May 1999, 89; Mike R. Vosper, FPL 124 Spring 2003, 29; 16.53
O6 R64
C95 Gerhard Hirsch Nachf., 22nd September 2011, 4113; Gerhard Hirsch Nachf., 2nd May 2012, 490; Gerhard Hirsch Nachf., 7th February 2013, 2082; 16.46
C116 A. Tkalec AG, 9th May 2005, 111; 16.94
O6 R74
C117 BM, 1888.1208.115; 16.74
O6 R84
C31 CNG, 14th June 2006, 1027; 17.21
O6 R119
C202 Sotheby, Auction 21st July 1983, 50; n/a
O6 R121
C205 Spink, Auction 13 October 1993, 46; 16.73
O10 R14
C15 CNG, 7th September 2005, 174; 16.53
O10 R15
C16 CNG, 21st September 2005, 460; 16.40
C164 Kovacs, MBS XIII 3 June 1998, 102; 16.66
O10 R55
C73 Gorny & Mosch, 2nd April 2001, 284; 16.77
O15 R12
C13 CNG, 8th September 2004, 79; Berk, BBS 80 18 January 1994, 282; 16.25
C29 CNG, 18th October 2006, 187; 16.63
C58 CNG, 4th January 2011, 427; 16.75
C61 CNG, 27th March 2013, 239; 16.70
C71 Künker, 8th October 2012, 552; 16.70
C76 Gorny & Mosch, 10th March 2003, 239; 16.88
O15 R48
C65 Peus, 5th November 2008, 485; Gorny & Mosch, 10th March 2003, 1558; 16.12

O15 R69
C104 Qunduz Hoard, 84; 16.69
C184 Leu Numismatik AG, Zürich, Auction 65 21-22 May 1996, 261; 16.66
O15 R89
C155 CNG, MBS 49 17 March 1999, 852; 16.64
O15 R116
C198 Lennox Gallery Ltd, FPL 2 June 1996, G127; n/a
O17 R7
C39 CNG, 9th January 2007, 450; A. Tkalec AG, Auction 22 April 2007, 115; CNG, MBS 51 15 September 1999, 701; 16.92
C85 Gorny & Mosch, 8th March 2004, 1689; 15.94
O17 R14
C36 CNG, 27th June 2007, 64; 15.50
C54 CNG, 5th January 2010, 253; Roma Numismatics Ltd, 31st March 2012, 353; 16.84
O17 R17
C19 CNG, 11th January 2005, 629; Ira & Larry Goldberg, 26th May 2008, 65; Ira & Larry Goldberg, 29th October 2009, 96; 16.94
C156 CNG, MBS 49 17 March 1999, 853; 16.85
O17 R25
C28 CNG, 18th October 2006, 186; 16.73
O17 R26
C30 CNG, 18th October 2006, 188; 16.10
O17 R39
C46 CNG, 12th September 2007, 939; 16.80
C59 CNG, 18th May 2011, 732; 16.06
C78 Gorny & Mosch, 13th October 2003, 262; 16.60
C79 Gorny & Mosch, 14th October 2003, 1511; 16.13
C84 Gorny & Mosch, 8th March 2004, 1688; 16.19
C105 Qunduz Hoard, 85; 16.34
C138 Gorny, Auction 102 24 May 2000, 349; 16.50
C162 CNG, (Triton III) 30 November 1999, 692; 17.00
O17 R66
C99 Ashmolean, 41; Sotheby, Auction 3rd May 1984, 195; 16.15
C201 Sotheby's London, Auction 16th February 1977, 50; 16.18
O17 R99
C183 Aï Khanum II 1973, 46; 15.29
C204 Spink, Auction 78 10 October 1990, 39; 16.20
O17 R117
C199 Dix Noonan Webb, 2008 Coinex Auction 29th September 2008, 5658; 15.15
O25 R25
C170 Peus, Auction 313 13 May 1985, 307; Spink, Auction 24 April 1998, 108; 16.15
O25 R39
C152 CNG, MBS 45 18 March 1998, 761; 16.82
O25 R66
C142 Münzen Auktion Essen, Auction 66 1-3 December 1993, 183; 16.52

O25 R75
C119 BM, 1863.0706.42; 15.62
C166 Kovacs, MBS XIV 16 October 1998, 86; 16.90
O25 R103
C80 Gorny & Mosch, 14th October 2003, 1512; 16.05
O27 R102
C98 Münzen & Medaillen Deutschland GmbH, 26th May 2011, 189; 15.40
C197 Artemide Asta, MBS XIX 14th December 2007, 1096; 15.27
O31 R66
C115 Stack's Bowers Galleries, 7th July 2011, 918; Glendining & Co. Ltd, Auction 28th July 1999, 44; 15.96
O31 R98
C182 Aï Khanum II 1973, 45; 15.62
O37 R18
C181 Auctiones A.G., Basel, Auction 16 1/2 October 1986, 272; Münzen und Medaillen AG Basel, List 531 April 1990, 17; 16.75
O37 R78
C130 Gorny, 64 11th October 1993, 247; CNG, Triton II 1/2 December 1998, 587; 16.95
O37 R95
C176 Galerie Antiker Kunst, List 5 December 1987, 16; 16.58
O45 R7
C208 Spink, Auction 11 April 2001, 94; 16.91
O45 R10
C172 Peus, Auction 314 30 October 1985, 282; 16.01
O45 R98
C210 CNG, Triton II 1/2 December 1998, 586; 16.56
O45 R118
C200 Italo Vecchi Ltd London, Auction 16 9th October 1999, 308; 14.99

Series I Group II (AP, A)

Obv. As above.
Rev. As above.

O48 R73
C113 Spink, 28th March 2012, 124; 16.22
O49 R34
C41 CNG, 23rd May 2007, 626; 16.20

Series I Transitional (☧)

Obv. As above.
Rev. As above. ΒΑΣΙΛΕΩΣ / ΔΙΚΑΙΟΥ / ΑΓΑΘΟΚΛΕΟΥΣ.

O50 R63
C93 Hess-Divo AG, 27th October 2010, 327; 16.13
C161 CNG, (Triton III) 30 November 1999, 691; 16.69
O50 R87
C148 CNG, MBS 35 20 September 1995, 438; Artemide Kunstauktionen, Auction 37, 8th December 2012, 64; 16.07

Series II (☧)

Obv. As above.
Rev. As above.

O7 R9
C9 CNG, 22nd May 2002, 1107; Aï Khanum II 1973, 47; 15.85
C11 CNG, 21st May 2003, 938; 16.83
O7 R35
C42 CNG, 23rd May 2007, 627; 16.34
O7 R101
C32 CNG, 14th June 2006, 1028; 14.78
O7 R122
C209 German Private Collection, 38; 16.3
O20 R8
C8 CNG, 25th September 2002, 957; 16.84
O32 R9
C120 BM, 1953.1014.2; 16.83
C146 Sotheby Zürich, 27/28 Oct 1993, 917; Bank Leu AG Zürich, Auction 28 5/6 May 1981, 210; 14.82
O32 R70
C108 *SNG* ANS, 232; 16.55
O32 R79
C131 Gorny, 64 11th October 1993, 248; P.-F. Jacquier, List 21 Summer 1998 230; 16.87
O32 R81
C134 Gorny, 82 29th April 1997, 165; CNG, Triton II 1/2 December 1998, 588; 16.91

Series III

Alexander Pedigree Group I ()

Obv. Head of Heracles wearing lion scalp facing right. ΑΛΕΞΑΝΔΡΟΥ / ΤΟΥ ΦΙΛΙΠΠΟΥ.
Rev. Zeus seated on throne facing left with long sceptre in left hand, bird resting on outstretched right hand. ΒΑΣΙΛΕΥΟΝΤΟΣ / ΔΙΚΑΙΟΥ / ΑΓΑΘΟΚΛΕΟΥΣ.

O5 R5
C5 *BNBact*, 22; 16.75
O5 R19
C22 CNG, 11th January 2005, 633; 16.48
C50 CNG, 8th January 2008, 358; 16.67
C96 Ira & Larry Goldberg, 24th May 2009, 1715; 16.60
C173 Alpha Bank, 7421; Peus, Auction 345 1-3 Nov 1995, 326; 15.96
C206 Spink, Auction 13 October 1993, 47; 16.36
O5 R80
C132 Gorny, 69 18th November 1994, 479; Bank Leu, Auction 18 1977, 265; Sotheby & Co Zürich, 26 October 1993 74; CNG, Triton II 1/2 December 1998, 589; 16.20

Alexander Pedigree Group II ()

Obv. As above.
Rev. As above.

O4 R4
C4 *BNBact*, 21; 15.70
C127 Berlin; n/a
O44 R4
C121 BM, 1880.0501.2; 16.33

Antiochus Nicator Prototype ()

Obv. Diademed bust of the king facing right. ΑΝΤΙΟΧΟΥ / ΝΙΚΑΤΟΡΟΣ.
Rev. Zeus standing, throwing thunderbolt with right hand, aegis over left arm, eagle with outstretched wings at feet. ΒΑΣΙΛΕΥΟΝΤΟΣ / ΔΙΚΑΙΟΥ / ΑΓΑΘΟΚΛΕΟΥΣ.

O52 R123
C213 CNG, Triton XII 5th January 2009, 401; 16.24

Antiochus Nicator Pedigree Group I ()

Obv. As above.
Rev. Zeus standing, throwing thunderbolt with right hand, aegis over left arm, eagle with outstretched wings at feet, wreath in left field. ΒΑΣΙΛΕΥΟΝΤΟΣ / ΔΙΚΑΙΟΥ / ΑΓΑΘΟΚΛΕΟΥΣ.

O12 R104
C33 CNG, 14th June 2006, 1031; 15.05
C211 CNG, Triton II 1/2 December 1998, 590; 16.43
O12 R105
C53 CNG, 6th January 2009, 402; 16.31
C158 CNG, MBS 49 17 March 1999, 854; 16.54
O12 R106
C23 CNG, 11th January 2005, 634; CNG MBS 33 15 March 1995, 467; Kovacs, MBS XV 1 October 2003, 177; 16.47
O12 R107
C149 CNG, MBS 37 20 March 1996, 801; 16.81
O12 R108
C140 Lanz München, Auction 64 7 June 1993, 332; 16.64
O12 R115
C196 Artemide Asta, MBS 1st/15th September 2005, 95; Artemide Asta, Auction 36, 12 July 2012, 80; 15.90

Antiochus Nicator Pedigree Group II ()

Obv. As above.
Rev. As above. No wreath.

O18 R33
C40 CNG, 9th January 2007, 451; 16.92
C186 Münzen und Medaillen AG Basel, Auction 79 28 February 1994, 423; Münzen und Medaillen AG Basel, Auction 85 11 April 1997 143; 16.64
C191 Alpha Bank Numismatic Collection, 4119; Spink, Auction 13 October 1993, 48; 16.8

Antiochus Nicator Pedigree Group III ()

Obv. As above.
Rev. Zeus standing, throwing thunderbolt with right hand, aegis over left arm, eagle with outstretched wings at feet, wreath in left field. ΒΑΣΙΛΕΥΟΝΤΟΣ / ΔΙΚΑΙΟΥ / ΑΓΑΘΟΚΛΕΟΥΣ.

O46 R109
C37 CNG, 14th February 2007, 68; 15.76
C66 Fitzwilliam Museum, CM 22-1971; 16.74
C122 BM, 1888.1208.113; 16.54
C212 National Museum of Georgia, Tbilisi (Bernard, 8); 16.70
O46 R110
C109 *SNG* ANS, 258; 16.30
O46 R114
C195 Spink, Coinex Sale 8 October 2003, 137; 16.50

Demetrius Pedigree Group I ()

Obv. Diademed head of king facing right wearing elephant scalp (helmet?). ΔΗΜΗΤΡΙΟΥ / ΑΝΙΚΗΤΟΥ.
Rev. Heracles standing facing, crowning himself with right hand, holding club and lion skin in left. ΒΑΣΙΛΕΥΟΝΤΟΣ / ΔΙΚΑΙΟΥ / ΑΓΑΘΟΚΛΕΟΥΣ.

O16 R30
C35 CNG, 10th January 2006, 1120; CNG, 6th January 2009, 403; 16.78
C51 CNG, 17th September 2008, 497; 15.69
C89 Gorny & Mosch, 12th October 2008, 153; 16.5

Demetrius Pedigree Group II ()

Obv. As above.
Rev. As above.

O14 R24
C27 CNG, 15th February 2006, 111; 15.76
C185 Leu Numismatik AG, Zürich, Auction 71 24 October 1997, 240;16.35
C192 Alpha Bank Numismatic Collection, 8734; 16.58
C193 Spink, Coinex Sale 8 October 2003, 139; 16.33
O14 R43
C52 CNG, 14th May 2008, 1020; 16.38
C126 BM, 1923.1107.1; 16.2

Diodotus Soter Pedigree Group I ()

Obv. Diademed head of king facing right. ΔΙΟΔΟΤΟΥ / ΣΩΤΗΡΟΣ.
Rev. Zeus standing, throwing thunderbolt with right hand, aegis over left arm, eagle with outstretched wings at feet, wreath in left field. ΒΑΣΙΛΕΥΟΝΤΟΣ / ΔΙΚΑΙΟΥ / ΑΓΑΘΟΚΛΕΟΥΣ.

O8 R11
C12 CNG, 21st May 2003, 939; 16.49
C17 CNG, 21st Sep 2005, 461; CNG, MBS 45 18 March 1998, 762; Kirk Davis, BBS 23, 64; 17.04
C106 Qunduz Hoard, 86; 16.45
O8 R61
C90 Gorny & Mosch, 13th October 2008, 1572; 16.59
C160 CNG, MBS 51 15 Sep 1999, 702; Kovacs, Kovacs MBS XV 1 October 2003, 178; 15.86
O8 R67
C100 Ashmolean Hollis Collection, 42; 14.50
C159 CNG, MBS 49 17 March 1999, 855; 16.68
O8 R94
C175 Felix Schlessinger, 4 February 1935, 1527; 15.30
O13 R11
C174 Peus, Auction 345 1-3 Nov 1995, 327; CNG, Triton II 1/2 Dec 1998, 591; 16.38
O13 R21
C24 CNG, 11th January 2005, 635; Gorny & Mosch, 11th October 2010, 376; Gorny & Mosch, 10th October 2011, 553; Heritage World Coins Auctions, 6th January 2008, 50037; CNG, MBS 35 20 September 1995, 439; 17.37
O13 R36
C43 CNG, 23rd May 2007, 628; 16.86
O13 R51
C55 CNG, 5th January 2010, 254; 16.96
C69 Künker, 8th Mar 2004, 1552; Gorny & Mosch, 11th Oct 2004, 286; Gorny & Mosch, 10th Oct 2005, 180; 16.85
C91 Gorny & Mosch, 10th Oct 2011, 554; The Bru Sale, 19 June 2010, 48; CNG, (Triton III) 30 Nov 1999, 693; 16.96
C110 *SNG* ANS, 259; Bank Leu AG Zürich, Auction 15 4/5 May 1976, 357; 15.98
O13 R54
C72 Künker, 8th October 2012, 553; 16.77
C143 Münzen Auktion Essen, Auction 74 28 November 1997, 116; 15.23

Diodotus Soter Pedigree Group III ()

Obv. As above.
Rev. As above.

O40 R56
C74 Gorny & Mosch, 14th October 2002, 340; Jean Elsen Vente Publique, 65 17-18th March 2001; Gorny, 32 12th and 13th November 1985; Bank Leu AG Zürich, Auction 71 24 October 1997, 239; 16.71
C75 Gorny & Mosch, 10th March 2003, 238; Gorny & Mosch, 9th October 2006, 236; 16.03
C97 Münzen & Medaillen Deutschland GmbH, 19th May 2005, 997; Münzen & Medaillen Deutschland GmbH, 18th October 2007, 2181; Spink, Auction 10 October 2002, 762; 15.69
C111 *SNG* ANS, 260; 17.03
C123 BM, 1872.0709.356; 16.98
O51 R112
C190 Alpha Bank Numismatic Collection, 4118; 16.48
O51 R120
C203 Sotheby, Auction 24 April 1998, 325; 14.92

Diodotus Theos Pedigree ()

Obv. Diademed head of king facing right. ΔΙΟΔΟΤΟΥ / ΘΕΟΥ.
Rev. As above.

O35 R33
C128 *BNBact*, Série 15 (*Collection privée*); RC Senior Ltd, List 1 1981, 17;n/a

Euthydemus Prototype ()

Obv. Diademed head of king facing right.
Rev. Heracles seated on rock draped with lion skin, holding club resting on knee in right hand. ΕΥΘΥΔΗΜΟΥ / ΜΕΓΑΛΟΥ.

O53 R124
C214 Alpha Bank Numismatic Collection, 9828; 16.53

Euthydemus Pedigree Group I ()

Obv. Diademed head of king facing right. ΕΥΘΥΔΗΜΟΥ / ΘΕΟΥ.
Rev. Heracles seated on rock, holding club resting on knee in right hand. ΒΑΣΙΛΕΥΟΝΤΟΣ / ΔΙΚΑΙΟΥ / ΑΓΑΘΟΚΛΕΟΥΣ.

O2 R2
C2 Ashmolean, H. De S. Shortt Bequest 1975; 15.70
O2 R22
C25 CNG, 11th January 2005, 636; CNG, Auction 40 4 December 1996, 1129; 16.78

C124 BM, 1872.0709.355; 17.14
C188 Alpha Bank Numismatic Collection, 4102; 16.79

O2 R23

C26 CNG, 11th January 2005, 637; Kovacs, MBS XIII 3 June 1998, 105; 16.45
C101 Ashmolean Hollis Collection, 43; 16.47

O2 R29

C34 CNG, 10th January 2006, 1119; Gorny & Mosch, 7th March 2005, 161; 16.68
C141 Lanz München, Auction 68 6 June 1994, 267; 14.51
C151 CNG, Triton I 2/3 December 1997, 613; 16.90

O9 R13

C14 CNG, 12th January 2004, 695; Selections from the Colin E. Pitchfork, 93; 15.76

O9 R32

C38 CNG, 8th August 2007, 144; 16.67

O9 R41

C48 CNG, 12th September 2007, 942; 16.69
C94 Hess-Divo AG, 27th October 2010, 328; Hess-Divo AG, 25th October 2012, 188; 16.67
C169 Münz Zentrum, Auction 39 16 April 1980, 739; 15.98

O9 R58

C82 Gorny & Mosch, 10th March 2003, 1559; 15.95
C139 P.-F. Jacquier, List 21 Summer 1998, 231; Peus, Auction 345 1-3 Nov 1995, 328; 16.69
C147 CNG, MBS 32 7 December 1994, 225; 16.63

O23 R32

C114 Spink, 28th March 2012, 125; Italo Vecchi London, Auction 16 9th Oct 1999, 309; 15.89
C136 Gorny, 95 9th March 1999, 428; 16.40

O23 R52

C70 Künker, 8th Mar 2004, 1553; Münzen Auktion Essen, 80 12/13 Sep 2000, 141; 16.90
C207 Spink, Auction 13 October 1993, 49; 16.64

O23 R57

C77 Gorny & Mosch, 10th March 2003, 240; 16.23

O23 R72

C112 *SNG* ANS, 261; Bank Leu AG Zürich, Auction 18 5 May 1977, 266; 15.80

O23 R82

C135 Gorny, 82 29th April 1997, 166; Gorny, 90 12/13 October 1998, 522; 16.84

O23 R91

C163 CNG, (Triton III) 30 November 1999, 694; 16.45

O23 R93

C167 Kovacs, MBS XIV 16 October 1998, 87; 15.65

Euthydemus Pedigree Group III ()

Obv. As above.
Rev. As above.

O11 R16
C18 CNG, 21st September 2005, 462; CNG, MBS 45 18 March 1998, 762; 17.09
C83 Gorny & Mosch, 10th March 2003, 1560; 15.73
C133 Gorny, 69 18th November 1994, 480; Galerie Antiker Kunst, List 4 January 1987, 6; CNG, Triton II 1/2 December 1998, 592; 16.77

O11 R76
C125 BM, 1993.1116.28; Bank Leu AG Zürich, Auction 15 4/5 May 1976, 358; 14.71

Pantaleon Pedigree Group II ()

Obv. Diademed bust of king facing right. ΠΑΝΤΑΛΕΟΝΤΟΣ / ΣΩΤΗΡΟΣ.
Rev. Zeus seated on throne holding long sceptre in left hand, Hecate with two torches on outstretched right hand. ΒΑΣΙΛΕΥΟΝΤΟΣ / ΔΙΚΑΙΟΥ / ΑΓΑΘΟΚΛΕΟΥΣ.

O36 R77
C129 Numismatic Fine Arts, 29th Nov 1990 230; Bank Leu AG Zürich, Auction 15 4/5 May 1976, 359; 15.42

O36 R113
C194 Spink, Coinex Sale 8 October 2003, 138; 15.73

Method	D_o	±	D_r	D_r/D_o	W
Carter	43	1.3	169.8	3.9	1.15
Good	38.3		139.4	3.6	
Esty, 1986	41.9		175.3	4.2	
Esty, 2011	45.2	4.2	209.1	4.6	1.19

AR Drachms

Series I Group I ()

Obv. Diademed head of king facing right
Rev. Zeus standing facing holding pointed sceptre in left hand, Hecate with two torches on outstretched right hand. ΒΑΣΙΛΕΩΣ ΑΓΑΘΟΚΛΕΟΥΣ.

O1 R1
C1 Ashmolean, J. B. Elliott 1859, Mitchiner 138a; 3.95
O2 R2
C2 *BNBact*, 2; 4.20
C3 *BNBact*, 3; 3.95
C5 CNG, 27th October 2004, 80; 3.92
C23 German Private Collection, 37; 4.2
O3 R3
C4 *BNBact*, 4; 3.88
O3 R10
C14 Sotheby & Co. Zürich, Auction 4/5 April 1973, 710; Sotheby London, Auction 31 May 1900, 454; 4.02
O4 R4
C6 CNG, 10th Jan 2006, 1117; Jean Elsen Vente Publique, 76 13th September 2003, 241; 4.20
O4 R12
C18 Peus, Auction 361 3-6 November 1999, 361; 4.10
O5 R5
C7 CNG, 12th September 2007, 941; 4.17
C11 BM, 1874.0709.3; 4.12
O6 R6
C8 Peus, 25th April 2001, 408; Peus, Auction 351 23-25 April 1997, 445; 4.24
O6 R7
C10 Gorny & Mosch, 10th March 2003, 241; 4.03
O7 R4
C9 Peus, 23rd April 2003, 194; 4.05
C21 Leu Numismatik AG, Zürich, Auction 72 12 May 1998, 375; 4.12
O10 R4
C17 CNG, MBS 46 24 June 1998, 619; 3.68
O10 R11
C15 CNG, MBS 38 6/7 June 1996, 499; 3.93
O11 R2
C20 Leu Numismatik AG, Zürich, Auction 65 21-22 May 1996, 262; 4.10
O11 R10
C16 CNG, (Triton 1) 2/3 December 1997, 612; 4.19

Series I Group III ()

Obv. As above.
Rev. As above.

O12 R13
C19 Bank Leu AG Zürich, Auction 13 29/30 April 1975, 323; 4.01
O13 R14
C22 Münzen und Medaillen AG Basel, List 539 January 1991, 29; 4.01

Series II ()

Obv. As above.
Rev. As above. ΒΑΣΙΛΕΩΣ / ΔΙΚΑΙΟΥ / ΑΓΑΘΟΚΛΕΟΥΣ.

O9 R9
C13 *SNG* ANS, 233; 4.04

CuNi 'Double units'

Obv. Head of Dionysus facing right wearing vine wreath, thyrsus over left shoulder.
Rev. Panther standing right with vine. ΒΑΣΙΛΕΩΣ / ΑΓΑΘΟΚΛΕΟΥΣ.

Group I ()

O2 R2
C2 Berlin, 1; n/a
O2 R10
C10 CNG, 7th September 2005, 175; 7.66
O5 R5
C5 CNG, 13th October 2004, 56; 8.08
O6 R6
C6 CNG, 4th August 2004, 80; 7.81
O7 R7
C7 CNG, 22nd September 2004, 1017; 7.53
O8 R8
C8 CNG, 5th January 2005, 104; 5.96
O8 R12
C14 CNG, 14th June 2006, 1029; 7.08
O9 R9
C9 CNG, 29th June 2005, 106; 7.56
O11 R12
C12 CNG, 28th June 2006, 70; 8.26
O12 R14
C15 CNG, 10th January 2006, 1118; 7.72

O16 R18
C19 CNG, 1st December 2010, 235; 8.16
O17 R19
C20 CNG, 17th August 2011, 180; 7.12
O20 R22
C23 Gorny & Mosch, 15th October 2002, 1556; 7.77
O21 R23
C24 Gorny & Mosch, 10th October 2006, 1548; Gorny & Mosch, 5th March 2007, 1572; 8.89
O25 R27
C28 BM, 1888.1208.119; 7.91
O25 R28
C29 BM, 1881.1205.8; 7.58
O29 R8
C33 *SNG* Copenhagen, 266; 6.67
O30 R32
C34 Ashmolean, Hollis Collection, 32; 7.48
O31 R33
C35 Ashmolean, Hollis Collection, 33; 8.86
O32 R34
C36 Ashmolean, Hollis Collection, 39; 8.23
O35 R38
C40 *SNG* ANS, 236; 7.45
O36 R39
C41 *SNG* ANS, 237; 6.84
O37 R40
C42 *SNG* ANS, 238; 6.60
O41 R44
C46 *BNBact*, 8; 8.08
O42 R45
C47 *BNBact*, 9; 7.85
O44 R47
C49 Gerhard Hirsch, Auction 184 23-25 November 1994, 446; n/a

Group II (𐤀)

O28 R31
C32 BM, India Office Collection 15; 7.62

Group III (𐤊)

O1 R1
C1 Ashmolean, H. De S. Shortt Bequest, 50; 7.18
O1 R48
C50 Gerhard Hirsch, Auction 184 23-25 November 1994, 447; n/a
O3 R3
C3 CNG, 4th April 2001, 732; 8.07

O4 R4
C4 CNG, 15th January 2002, 1676; 7.81
O10 R11
C11 CNG, 25th May 2005, 185; 8.42
O10 R13
C13 CNG, 18th January 2006, 108; 7.65
O10 R35
C37 Ashmolean, Hollis Collection, 40; 8.11
O14 R16
C17 CNG, 26th August 2009, 205; 7.10
O15 R17
C18 CNG, 25th March 2009, 247; 7.84
O18 R20
C21 Emporium Hamburg, 17th November 2011, 124; 7.98
O19 R21
C22 Künker, 8th March 2004, 1551; 8.06
O22 R15
C16 CNG, 25th June 2008, 149; 7.28
O22 R24
C25 Gorny & Mosch, 5th March 2007, 1573; 6.97
O23 R25
C26 BM, 1922.0424.2917; 7.79
O24 R26
C27 BM, 1888.1208.120; 7.69
O33 R36
C38 *SNG* ANS, 234; 7.53
O34 R37
C39 *SNG* ANS, 235; 6.65
O38 R41
C43 *BNBact*, 5; 7.93
O39 R42
C44 *BNBact*, 6; 7.59
O40 R43
C45 *BNBact*, 7; 6.78

Group IV ()

O26 R29
C30 BM, 1888.1208.118; 8.29
O27 R30
C31 BM, 1888.1208.117; 7.89
O43 R46
C48 *BNBact*, 10; 7.86

CuNi 'units'

Obv. As above.
Rev. As above.

Group I ()

O5 R5
C5 *BNBact*, 11; 3.50
O5 R10
C10 CNG, 3rd September 2003, 64; 3.61

Group III ()

O1 R1
C1 BM, 1881.1205.9; 4.08
O2 R2
C2 BM, 1888.1208.121; 3.81
O3 R3
C3 Ashmolean, Hollis Collection, 34; 3.52
O4 R4
C4 Ashmolean, Hollis Collection, 35; 3.89
O8 R8
C8 *SNG* ANS, 239; 3.46

Illegible monogram

O6 R6
C6 *BNBact*, 12; 3.56
O7 R7
C7 *BNBact*, 13; 3.41
O9 R9
C9 *SNG* ANS, 240; 3.84
O10 R11
C11 CNG, 4th October 2006, 145; 3.99
O11 R12
C12 CNG, 14th June 2006, 1030; 3.91
O12 R13
C13 CNG, 27th October 2010, 191; 3.46

AE ‘Double units’

Obv. As above.
Rev. As above.

Group II (ΑΡ)
C1 Ashmolean, J.B. Elliot 1859; 7.86
C2 Sammlung Köhler-Osbahr; 8.36

Group III (ΡΚ)
C3 Ashmolean, Oman 1947; 7.81

Illegible
C4 Fitzwilliam Museum, India Office 1906; 5.20

Obv. Head of Zeus, bearded facing right with cornucopia over left shoulder.
Rev. Goddess standing facing. ΒΑΣΙΛΕΩΣ / ΑΓΑΘΟΚΛΕΟΥΣ.
C5 *SNG* ANS; 7.55

AR Square unknown denomination

Obv. God (Samkarshana?) facing, wearing ear rings, carrying a sheath on his left side, holding object in right hand, plough in left. ΒΑΣΙΛΕΩΣ / ΑΓΑΘΟΚΛΕΟΥΣ.
Rev. God (Vasudeva-Krishna?) facing, holding wheel in left hand and conch (?) in right. In Brahmi script: *Rajane / Agathuklayasa.*

O1 R1
C1 Audouin & Bernard, *RN* 1974, 1; 3.31
O1 R2
C2 Audouin & Bernard, *RN* 1974, 2; 2.57
O2 R3
C3 Audouin & Bernard, *RN* 1974, 3; 3.24
C4 Audouin & Bernard, *RN* 1974, 4; 2.90
C5 Audouin & Bernard, *RN* 1974, 5; 2.50
C6 Audouin & Bernard, *RN* 1974, 6; 2.33

Method	D_o	±	D_r	D_r/D_o	W
Carter	2.5	2.1	4.9	2	0.62
Good	2		4.5	2.3	
Esty, 1986	2		6	3	
Esty, 2011	3	6.9	6	2	0.6

AE 'Large module'

Obv. Female (deity?) moving to left, holding flower in right hand. In Brahmi script: *Rajane Agathuklayasa.*
Rev. Lion standing right. ΒΑΣΙΛΕΩΣ / ΑΓΑΘΟΚΛΕΟΥΣ.

O1 R1
C1 BM, 1894.0506.757; 15.50
O1 R3
C3 BM, 1844.0909.61; 12.51
C9 BM, 1848.0617.45; 11.04
C17 *SNG* ANS, 247; 11.67
O1 R24
C28 Fitzwilliam Museum India Office 1906, Masson Collection; 9.81
O1 R34
C41 Adolph E. Cahn, Auction 80 27 February 1933, 436; 14.36
O2 R2
C2 BM, 1894.0506.760; 12.64
O3 R4
C4 BM, India Office Collection 18; 12.04
O3 R12
C13 *BNBact*, 18; 11.70
O3 R17
C19 *SNG* ANS, 249; 11.27
O4 R5
C5 BM, 1894.0506.1879; 11.89
O4 R7
C7 BM, 1894.0506.1880; 11.33
O4 R21
C27 Fitzwilliam Museum Tremlett Bequest 1918, T.56-1918; 14.52
O4 R25
C29 Fitzwilliam Museum Tremlett Bequest 1918, India Office Collection; 14.15
O4 R31
C42 CNG MBS 47 16 September 1998, 753; 11.68
O5 R6
C6 BM, 1894.0506.758; 11.74
O5 R16
C18 *SNG* ANS, 248; 11.61
O6 R2
C24 *SNG* ANS, 254; 10.08
O6 R8
C8 BM, 1894.0506.756; 11.19
O6 R9
C10 BM, India Office Collection 17; 9.87
O6 R13
C14 *SNG* ANS, 242; 15.06

O6 R14
C15 *SNG* ANS, 243; 13.22
O6 R23
C26 *SNG* Copenhagen, 267; 13.63
O6 R31
C36 R. Barthold-J.C. Baudey & M.Pesce-A. Poi, Auction 19th-20th June 1984, 226b; n/a
O7 R10
C11 *BNBact*, 16; 14.32
C37 CNG, Electronic Auction 244 10th November 2010, 254; 15.51
O7 R19
C21 *SNG* ANS, 251; 10.73
O8 R11
C12 *BNBact*, 17; 13.61
O9 R15
C16 *SNG* ANS, 244; 13.06
O9 R26
C30 Fitzwilliam Museum India Office 1906, Masson Collection; 13.42
O10 R18
C20 *SNG* ANS, 250; 10.74
O10 R22
C25 *SNG* ANS, 255;10.01
O10 R27
C32 Fitzwilliam Museum, Unknown; 9.55
O10 R29
C34 Fitzwilliam Museum, Masson Collection; 10.40
O11 R20
C22 *SNG* ANS, 252; 10.49
O11 R21
C23 *SNG* ANS, 253; 10.32
O12 R1
C31 Fitzwilliam Museum India Office 1906, Masson Collection; 13.76
O12 R36
C45 Felix Schlessinger, Auction 4 February 1935, 1529; n/a
O13 R28
C33 Fitzwilliam Museum, Masson Collection; 12.67
C46 Münz Zentrum Rhineland, Auction 157 12 January 2011, 228; 11.02
O13 R32
C39 CNG, Electronic Auction 207 25th March 2009, 248; 12.27
O14 R30
C35 R. Barthold-J.C. Baudey & M.Pesce-A. Poi, Auction 19th-20th June 1984, 226a; n/a
O15 R21
C38 CNG Electronic Auction 243 27th October 2010, 192; 10.78
O15 R33
C40 CNG Electronic Auction 84 3rd March 2004, 95; 11.59
O16 R2
C43 Leipziger Münzhandlung, Auction 54 18-19 May 2007, 1464; 12.32

O16 R37
C47 Sammlung Köhler-Osbahr, 122; 12.63
O17 R35
C44 Peus, Auction 338 27-29 April 1994, 503; 11.04
O18 R38
C48 German Private Collection, 39; 12.5

Method	D_o	±	D_r	D_r/D_o	W
Carter	23.5	2.5	142.7	6.1	2.49
Good	20.1		107.3	5.3	
Esty, 1986	22.9		151.1	6.6	
Esty, 2011	28.8	9.1	182.4	6.3	2.75

AE 'Small module'

Obv. Arched hill with star/son on top. *Agathukreyasa.*
Rev. Three-branched tree in enclosure. *Hiranasame.*

O1 R1
C1 BM, 1888.1208.122; 5.66
C2 BM, 1850.1130.94; 5.33
O2 R2
C3 BM, 1922.0424.2939; 5.33
C4 *BNBact*, 20; 4.65
C6 *SNG* ANS, 257; 4.28
C8 German Private Collection, 40; 5.4
O3 R2
C5 *SNG* ANS, 256; 5.83
C7 *SNG* Copenhagen, 268; 5.19

Antimachus I

AR Tetradrachms

Diodotus Soter Pedigree Group ( )

Obv. Diademed head of king facing right. ΔΙΟΔΟΤΟΥ / ΣΩΤΗΡΟΣ.
Rev. Zeus standing, throwing thunderbolt with right hand, aegis over left arm, eagle with outstretched wings at feet, wreath in left field. ΒΑΣΙΛΕΥΟΝΤΟΣ / ΘΕΟΥ / ΑΝΤΙΜΑΧΟΥ

O22 R36
C40 *SNG* ANS, 296; 15.65
C45 Museum of Fine Arts, Boston, 308; Dr Jacob Hirsch, Auction 31 6th May 1912, 515; 16.84
C231 CNG, MBS 32 7 December 1994, 225; 16.44
O22 R105
C173 Spink, Auction 3014 8th October 2003, 143; 16.79
C261 Hirsch Nachf., Auction 188 22-24 Nov 1995, 411; CNG, Triton II 1/2 Dec 1998, 598; 16.58
C289 CNG, MBS 47 16 September 1998, 759; 16.16

Euthydemus Theos Pedigree Group ( )

Obv. Diademed head of king facing right. ΕΥΘΥΔΗΜΟΥ / ΘΕΟΥ.
Rev. Heracles seated on rock, holding club resting on knee in right hand. ΒΑΣΙΛΕΥΟΝΤΟΣ / ΘΕΟΥ / ΑΝΤΙΜΑΧΟΥ .

O5 R6
C6 BM, 1898.0406.1; 16.03
C9 Ashmolean, 44, H. De S. Shortt Bequest 1975; 15.61
O5 R37
C42 *SNG* ANS, 298; Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 322; 15.65
C246 Gorny, Auction 95 9th March 1999, 429; 16.10
O5 R183
C163 CNG, Triton VII 12th January 2004, 697; Gorny, Auction 69 18th November 1994, 472; Münzen & Medaillen AG Basel, Auction 76 19/20 September 1991, 839; CNG, Triton II 1/2 December 1998, 599; 16.51
O5 R189
C371 Alpha Bank Numismatic Collection, 9348; 16.68
O18 R29
C33 Qunduz Hoard, 99; 16.83
O18 R103
C168 Gorny & Mosch, Auction 126 14th October 2003, 1517; 16.22
C244 Gorny, Auction 89 5th May 1998, 293; 16.99
C275 H. H. Kricheldorf, Nachf. Auction 46 17 July 1998, 45; 15.93
C288 Berk, BBS 90, 17 April 1996, 182; n/a
C369 Zeymal, *Drevnie monety Tadzhikistana*, 76; 16.20

O18 R108
C184 Gorny & Mosch, Auction 122 10th March 2003, 1566; 16.67
C195 CNG, MBS 60 22nd May 2002, 1111; 16.14
O18 R149
C290 Bank Leu AG Zürich, Auction 18 5 May 1977, 268; 16.21
O19 R30
C34 Qunduz Hoard, 100; 16.61
C41 *SNG* ANS, 297; 16.73
O19 R202
C403 Ashmolean, Hollis Collection; 16.99

Standard Tetradrachms

Obv. Head of king, facing right, wearing diadem and *kausia*.
Rev. Poseidon standing facing, holding trident in right hand and palm with ribbon in left. ΒΑΣΙΛΕΩΣ ΘΕΟΥ / ΑΝΤΙΜΑΧΟΥ.

Group I (Ⲣ)

O1 R1
C1 BM, 1858.0731.4; 16.61
O1 R40
C47 Noble Numismatics Pty Ltd, Auction 85, 3963; Heritage World Coins Auctions, Long Beach Signature Sale 387 23rd September 2005, 12083; 16.13
O1 R49
C57 Spink, 12009 28th March 2012, 126; 16.56
O1 R104
C172 Spink, Auction 3014 8th October 2003, 142; 16.70
O1 R160
C310 CNG, MBS 38 6/7 June 1996, 503; 16.55
O1 R165
C322 CNG, MBS 47 16 September 1998, 756; 16.73
O1 R181
C368 Aureo, Auction 3 Mar 2004, 1019; Marti Hervera, Auction 18th Nov 1999, 2026; 16.40
O12 R104
C352 Peus, Auction 345 1-3 November 1995, 332; 15.57
O12 R129
C239 Bankhaus Aufhäuser, Auction 12 1-2 October 1996, 296; 16.52
O12 R174
C344 Pegasi, MBS XXV 8 November 2011, 233; 16.76
O12 R195
C390 Italo Vecchi Ltd London, Auction 16 9th October 1999, 307; 16.42

O12 R200
C400 German Private Collection, 46; 17.0
O26 R21

C24 Qunduz Hoard, 90; 16.50

O26 R48

C56 Comptoir Général Financier, MBS 53 19th April 2012, 141; Sotheby & Co. London, Auction 17th April 1985, 387; 16.10

O26 R99

C157 Gorny & Mosch, Auction 130 8th March 2004, 1695; Munthandel G. Henzen, List 183 November 2007, 297; 16.88

O26 R113

C199 CNG, MBS 58 19th September 2001, 870; 16.60

O26 R150

C292 Münzen Auktion Essen, Auction 75 6 May 1998, 292; 16.40

O75 R13

C14 *BNBact*, 3; 16.54

C346 Münzhandlung Hans Linnartz, FPL 17 Winter 1996, 3; 16.92

O75 R170

C335 Kovacs, MBS XIII 3 June 1998, 106; 16.31

O76 R22

C25 Qunduz Hoard, 91; 16.73

C281 B. Ahlström, Auction 61, 15-16 April 2000, 1467; n/a

O77 R60

C78 Fitzwilliam Museum, Y. 1086-1936; 16.90

Group II ()

O8 R9

C10 Ashmolean, Hollis Collection; 16.36

C21 Qunduz Hoard, 87; 16.83

C58 CNG, Electronic Auction 274 22nd February 2012, 215; 16.57

C74 H.D. Rauch, Auction 63 3-4th May 1999, 88; 16.43

C121 CNG, Electronic Auction 131 18th January 2006, 109; 16.06

C127 CNG, MBS 70 21st September 2005, 463; 16.66

C130 CNG, Electronic Auction 115 25th May 2005, 186; 16.54

C134 CNG, Electronic Auction 109 2nd March 2005, 70; 16.09

C141 CNG, Electronic Auction 101 10th November 2004, 66; 16.47

C192 CNG, MBS 61 25th September 2002, 960; 16.90

C194 CNG, MBS 60 22nd May 2002, 1108; 16.93

C208 CNG, MBS 57 4th April 2001, 733; 16.91

O8 R31

C35 *SNG* ANS, 274; 16.81

C59 CNG, Electronic Auction 271 11th January 2012, 26; Artemide Kunstauktionen, Auction 37, 8th December 2012, 65; CNG, Triton II 1/2 December 1998, 595; 16.81

C259 Gorny & Mosch, Gorny & Mosch Auction 104 9th-10th October 2000, 504; 16.68

O8 R42

C54 Künker, Auction 216 8th October 2012, 555; CNG, Electronic Auction 150 18th October 2006, 185; Pegasi, MBS VIII 29 April 2003, 225; Pegasi, BBS 131 27 July 2004, 149; 16.47

C73 H.D. Rauch, Auction 63 3-4th May 1999, 87; 16.51

C224 Dmitry Markov Coins & Medals, The New York Sale IX 13th January 2005, 127; 17.00

C227 M&M Numismatics Ltd, The New York Sale V 17th January 2002, 261; 16.93

O8 R50

C373 Artemide Asta, Auction 32 10th April 2011, 71; 15.74

O8 R52

C63 CNG, Electronic Auction 259 6th July 2011, 180; 16.75

O8 R62

C177 CNG, MBS 63 21st May 2003, 940; 16.56

C190 CNG, MBS 61 25th September 2002;959; 16.97

O8 R65

C372 Artemide Asta, MBS XIX 14th December 2007, 1095; 15.78

O8 R78

C107 CNG, MBS 76 12th September 2007, 943; 16.84

O8 R133

C252 Gorny, Auction 101 6th March 2000, 481; 15.56

C269 Gerhard Hirsch Nachf., Auction 218 28-30 November 2001, 618; n/a

C294 Münzen Auktion Essen, Münzen Auktion Essen Auction 75 6 May 1998, 294b; n/a

O8 R153

C297 La Galerie Numismatique, Auction 11 13 January 2008, 30; 15.35

O10 R11

C12 *BNBact*, 1; 16.84

C129 Cayón Subastas, Auction 6th Oct 2005, 151; CNG, MBS 69 8th June 2005, 802; 16.82

O10 R53

C64 Ira & Larry Goldberg, Auction 63 31st May 2011, 2511; 16.95

C385 Morton & Eden, Auction 11th June 2008, 886; 16.88

O10 R66

C377 John Cummings Ltd, FPL May 1997, G149; n/a

O10 R131

C243 Gorny, Auction 89 5th May 1998, 292; Münzen Auktion Essen, Auction 66 1-3 December 1993, 179; Münzen Auktion Essen, Auction 80 12/13 September 2000, 138; 16.59

O10 R151

C293 Münzen Auktion Essen, Münzen Auktion Essen Auction 75 6 May 1998, 294a; n/a

O10 R184

C395 Sotheby & Co. London, Auction 3rd May 1984, 193; 15.85

O11 R12

C13 *BNBact*, 2; 16.75

C22 Qunduz Hoard, 88; 16.81

C92 Ponterio & Associates, Sale 149 CICF Auction 24th April 2009, 2112; CNG, MBS 51 15 September 1999, 703; Pegasi, MBS XXVIII 28 May 2013, 253; 16.84

C222 Freeman & Sear, MBS 13 25th August 2006, 277; 15.99

C364 Münz Zentrum, Rhineland Auction 155 28 April 2010, 181; Münz Zentrum, Rhineland Auction 156 1 September 2010, 243; 15.53

C393 Sotheby & Co. London, Haughton Collection 1st May 1958, 305; 16.86

O11 R20

C23 Qunduz Hoard, 89; 16.38

C108 CNG, MBS 76 12th September 2007, 944; Kirk Davis, BBS 51 Spring 2008, 53; 16.96

C225 Gemini, LLC Auction I 11th January 2005, 225; 16.96

C230 Cabinet Albuquerque, Auction 45 25th June 1994, 178; 16.15

O11 R43

C221 Gemini, LLC Auction IV 8th January 2008, 246; 16.97

C330 CNG, MBS 51 15 September 1999, 704; 16.79

C387 Senior Consultants, List Undated, 9; n/a

O11 R61

C362 Leu Numismatik AG, Zürich Auction 71 24 October 1997, 241; 16.93

O11 R65

C84 Nomos AG, Auction 2 18th May 2010, 144; Ira & Larry Goldberg, Auction 55 29th October 2009, 97; Ira & Larry Goldberg, Auction 46 26th May 2008, 64; 16.97

C110 CNG, MBS 75 23rd May 2007, 631; 16.53

C136 CNG, Electronic Auction 107 2nd February 2005, 127; 16.95

C216 Heritage World Coins Auctions, New York Signature Sale 3021 6th January 2013, 21286; 16.43

C287 Münzen Auktion Essen, Auction 66 1-3 December 1993, 180; 16.92

O11 R119

C210 Künker, Auction 62 13th March 2001, 169; 16.84

C296 Münzen Auktion Essen, Auction 80 12/13 Sept 2000, 139; Münz Zentrum, Rhineland Auction 143 16/17 April 2008, 145; 16.97

C311 CNG, MBS 39 18 September 1996, 857; 16.78

C315 CNG, Triton I 2/3 December 1997, 615; 16.97

C401 CNG, Triton II 1/2 December 1998, 596; 16.97

O11 R153

C331 CNG, MBS 51 15 September 1999, 705; 16.79

O11 R171

C337 Kovacs, MBS XIV 16 October 1998, 88; 16.90

O15 R31

C72 H.D. Rauch, 63 3-4th May 1999, 86; 16.58

C82 CNG, Auction 85 15th September 2010, 560; 16.96

C103 CNG, Electronic Auction 182 20th February 2008, 114; 16.07

C111 CNG, MBS 75 23rd May 2007, 632; CNG, MBS 58 19th September 2001, 868; 16.87

C175 CNG, MBS 64 24th September 2003, 547; 16.70

C185 Gorny & Mosch, Auction 122 10th March 2003, 1563; 16.66

C205 CNG, MBS 57 4th Apr 2001, 735; Worldwide Treasure Bureau, BBS 10 Mar 2004, 74; 16.88

C217 Heritage World Coins Auctions, New York Sale 3021 6th January 2013, 21287;1 6.18

C332 CNG, Triton III 30 November 1999, 695; 16.92

O15 R42

C49 Künker, Auction 226, 624; Künker, Auction 136 10th March 2008, 751; Hauck & Aufhäuser, Auction 20 16th October 2007, 200; 16.92

C71 Hess-Divo AG, Auction 317 27th October 2010, 330; 16.34

C109 CNG, Electronic Auction 170 8th August 2007, 145; 16.02

C167 Gorny & Mosch, Auction 126 14th October 2003, 1516; 16.58

C193 CNG, MBS 60 22nd May 2002, 1109; 16.76

C212 Numismatik Lanz München, Auction 97 22nd May 2000, 368; 16.97

C374 Jesus Vico, S.A., Auction 1st June 2000, 104; 16.00

O15 R44

C264 Gerhard Hirsch Nachf., Auction 208 17-19 February 2000, 1915; 16.07

O15 R52

C176 CNG, Electronic Auction 68 9th July 2003, 120; 16.68

O15 R61

C396 Spink Coin Auctions, Auction 13 October 1993, 50; 17.06

O15 R62

C80 Argenor Numismatique, FPL Oct 2002, 367; Künker, Auction 71 12th Mar 2002, 475; 16.66

C89 Gerhard Hirsch Nachf., Auction 263 24th September 2009, 2505; Gerhard Hirsch Nachf., Auction 260 12th February 2009, 1842; Gorny & Mosch, Auction 104 9th-10th October 2000, 500; 16.77

C189 Gorny & Mosch, Auction 117 14th October 2002, 342; 16.96

C196 Gorny & Mosch, Auction 115 5th March 2002, 1226; 15.70

C197 CNG, Triton V 15th January 2002, 1678; 16.96

O15 R84

C119 Gorny & Mosch, Auction 146 6th March 2006, 286; 16.59

O15 R114

C200 CNG, MBS 58 19th September 2001, 869; Westmoreland Collection, 79; 16.20

C367 NAC, Auction 11 29 April 1998, 118; 16.85

O27 R50

C60 Gorny & Mosch, Auction 199 10th October 2011, 555; 16.56

C122 CNG, Triton IX 10th January 2006, 1121; 16.43

C253 Gorny, Auction 101 6th March 2000, 482; 16.82

C323 CNG, MBS 47 16 September 1998, 757; 16.95

O27 R53

C94 Gorny & Mosch, Auction 175 9th March 2009, 162; 16.50

O27 R63

C81 Jesus Vico, S.A., Auction 114, 7 June 2007, 67; Argenor Numismatique, Auction 7 13th April 2005, 95; Peus, Auction 372 30th October 2002, 758; 16.63

C142 CNG, Electronic Auction 100 27th October 2004, 81; 16.54

O27 R66

C86 CNG, Triton XIII 5th January 2010, 1367; Spink, Auction 5014 28th September 2005, 210; 15.95

C174 CNG, MBS 64 24th September 2003, 548; 16.26

C238 Bankhaus Aufhäuser, Auction 11 21-22 March 1995, 172; 16.00

C399 German Private Collection, 44; 16.5

O27 R70

C95 Peus, Auction 396 5th Nov 2008, 486; Gorny, Auction 122 10th Mar 2003, 1564; 16.51

O27 R127

C234 Maison Palombo, Auction 7 13th June 2009, 127; 16.52

O27 R132

C247 Gorny, Auction 95 9th March 1999, 433; 15.05

O27 R135

C258 Gorny & Mosch Auction 104 9th-10th October 2000, 503; 16.28

O36 R11

C105 CNG, Triton XI 8th January 2008, 359; 16.94

O36 R90

C140 CNG, Electronic Auction 102 24th November 2004, 147; 16.81

C274 H. H. Kricheldorf, Nachf. Auction 45 15/16 July 1996, 88; 15.91

O36 R131

C361 Leu Numismatik AG, Zürich Auction 65 21-22 May 1996, 263; 16.81

O36 R176

C350 Münz Zentrum, Auction 72 2 December 1991, 955; 16.78

O36 R184

C155 Leu Numismatik AG, Auction 91 10th May 2004, 200; Schweizerischer Bankverein Zürich, Auction 33 20-22 September 1993, 444; 16.94

O41 R50

C124 Peus, Auction 384 2nd November 2005, 467; Peus, Auction 371 24th April 2002, 300; Peus, Auction 355 27-29 April 1998, 778; 16.93

C135 CNG, Electronic Auction 108 16th February 2005, 28; 15.51

C343 Pegasi, MBS XXII 20 April 2010, 230; 15.71

O41 R53

C137 CNG, Triton VIII 11th January 2005, 638; 16.94

C211 Peus, Auction 366 29th October 2000, 290; Peus, Auction 361 3-6 November 1999, 363; 15.95

O41 R66

C236 Athena, Lagerliste 19, 86; 15.78

O41 R128

C235 Athena, Lagerliste 20, 113; Gerhard Hirsch Nachf., Auction 231 26-28 November 2003, 472; 15.57

O42 R50

C342 Pegasi, MBS XIX 18 November 2008, 187; 15.71

C355 Schulman, Auction 333 23 April 2010, 578; 16.08

O42 R88

C131 CNG, Electronic Auction 110 16th Mar 2005, 68; Aureo, Auction 25 Oct 2006, 4; 16.08

C329 CNG, MBS 49 17 March 1999, 850; 16.80

O42 R166

C324 CNG, MBS 47 16 September 1998, 758; 16.02

O42 R178

C354 Munthandel G. Henzen, List 162 August 2005, 206; Munthandel G. Henzen, List 170 August 2006, 258; 15.48

C379 John Cummings Ltd, FPL (undated), G88; n/a

O46 R44

C51 Ira & Larry Goldberg, Auction 72 5th February 2013, 4102;16.90

C191 CNG, MBS 61 25th September 2002, 961; 16.82

C257 Gorny & Mosch Auction 104 9th-10th October 2000, 502; 16.15

O46 R53

C333 CNG, Triton III 30 November 1999, 696; 16.97

C386 Senior Consultants, List Undated, 8; n/a

O46 R61

C383 Glendining & Co. Ltd, Auction 28th July 1999, 43; 16.01

O46 R159

C308 CNG, MBS 33 15 March 1995, 469; 16.54

O51 R31

C256 Gorny & Mosch Auction 104 9th-10th October 2000, 501; 16.60

O51 R32

C36 *SNG* ANS, 275; 16.72

O51 R42

C67 Spink, Auction 1012 2nd December 2010, 1277; 16.67

C152 CNG, MBS 66 19th May 2004, 949; 16.89

C262 Gerhard Hirsch Nachf., Auction 188 22-24 November 1995, 412; Lanz München, Auction 72 29

May 1995, 314; 16.99

O51 R44

C148 Gorny & Mosch Auction 134 11th October 2004, 1686; 16.35

O51 R61

C79 Argenor Numismatique, Auction 3 14th April 2000, 56; H.D. Rauch, Auction 83 14th November 2008, 94; Hess-Divo AG, Auction 308 24th October 2007, 90; 16.88

C270 Gerhard Hirsch Nachf., Auction 231 26-28 November 2003, 473; 15.54

O51 R168

C327 CNG, MBS 49 17 March 1999, 848; 16.86

C328 CNG, MBS 49 17 March 1999, 849; 16.71

O51 R199

C397 Tietjen & Co., Auction 104 17th December 2009, 241; 15.07

O86 R43

C50 Gerhard Hirsch Nachf., Auction 287 7th February 2013, 2081; Gerhard Hirsch Nachf., Auction 281 2nd May 2012, 489; Gerhard Hirsch Nachf., Auction 271 17th February 2011, 2104; ArtCoins Roma, Auction 7 20 May 2013, 289; 15.91

C138 CNG, Triton VIII 11th January 2005, 640; 16.96

C307 CNG, MBS 33 15 March 1995, 468; Senior Consultants, List Undated, 9; 16.64

O86 R119

C241 Gorny, Auction 64 11th October 1993, 246; 16.94

O87 R11

C178 Peus, Auction 374 23rd April 2003, 195; Spink, Auction 5020 30th Sep 2005, 562; 16.97

C209 Gorny & Mosch, Auction 107 2nd April 2001, 285; Frank Sternberg Zürich, MBS 1 18th Dec 1999, 316; 16.73

C213 A. Tkalec AG, Auction January 2000 29th February 2000, 197; CNG, Triton 1 2/3 December 1997, 614; 16.98

O87 R78

C181 Gorny & Mosch, Auction 121 10th March 2003, 242; 16.89

O87 R86

C139 CNG, Triton VIII 11th January 2005, 639; 16.94

Group III (Ⓝ)

O3 R3

C3 BM, 1888.1208.114; 16.97

C169 Gorny & Mosch, Auction 125 13th October 2003, 263; Munthandel G. Henzen, List 149 June 2004, 158; 16.84

C336 Kovacs, MBS XIII 3 June 1998, 107; 16.76

C351 Münz Zentrum, Auction 101 15-18 December 1997, 169; 17.10

O3 R4

C4 BM, 1888.1208.123; 16.32

O3 R25

C28 Qunduz Hoard, 94; 16.98

O3 R34

C46 Ball State University Museum of Art, 78; 16.60

C113 Gorny & Mosch, Auction 155 5th March 2007, 167; 16.81

O3 R46

C159 Gorny & Mosch, Auction 129 8th March 2004, 203; 16.67

O3 R51

C61 Künker, Auction 193 26th September 2011, 305; 16.65

O3 R92

C218 Heritage World Coins Auctions, New York Signature Sale 3021 6th January 2013, 21284; 15.99

O3 R96

C180 Gorny & Mosch, Auction 122 10th March 2003, 1561; 16.84

O3 R112

C198 CNG, MBS 58 19th September 2001, 872; 17.03

O3 R122

C219 NAC, Auction 54 24th March 2010, 139; 16.87

O3 R136

C280 Lanz München, Auction 78 25 November 1996, 370; 16.56

O3 R138

C265 Gerhard Hirsch Nachf., Auction 206 24-26 November 1999, 279; 15.65

O9 R10

C11 Ashmolean, H. De S. Shortt Bequest 1975; *SNG* Lockett Collection, 3354; 16.32

C62 Gerhard Hirsch Nachf., Auction 275 22nd September 2011, 4111; 16.82

C100 CNG Electronic Auction 187 30th April 2008, 87; 15.83

C277 Lanz München, Auction 64 7 June 1993, 333; 16.59

C378 John Cummings Ltd, FPL (undated), G87; n/a

O9 R17

C18 *BNBact*, 7; 16.41

O9 R38

C43 Museum of Fine Arts, Boston, 2239; 16.80

O9 R47

C55 Künker, Auction 216 8th Oct 2012, 556; Münzen Auktion Essen, Auction 66 1-3 Dec 1993, 181; 16.87

C166 Gorny & Mosch, Auction 126 14th October 2003, 1515; 16.68

O9 R55

C69 Noble Numismatics Pty Ltd, Auction 95 23rd November 2010, 5312; 15.66

O9 R56

C70 Hess-Divo AG, Auction 317 27th October 2010, 329; 16.91

O9 R57

C68 CNG, Electronic Auction 245 1st Dec 2010, 236; CNG, MBS 57 4th April 2001, 738; 16.78

C75 G. Apparuti - F. Sternberg, Auction 18 20th-21st November 1986, 205; Sotheby & Co. London, Auction 20th May 1986, 175; 16.71

C206 CNG, MBS 57 4th April 2001, 739; 16.95

O9 R76

C161 Künker, Auction 89 8th March 2004, 1555; 16.52

C291 Münzen Auktion Essen, Auction 75 6 May 1998, 291; 14.82

O9 R82

C116 Spink, Auction 6018 26th September 2006, 755; 16.90

O9 R93

C145 Gorny & Mosch, 134 11th October 2004, 1678; 16.77

O9 R98

C156 Leu Numismatik AG, Auction 91 10th May 2004, 201; 16.81
C357 CNG, Electronic Auction 300 10 April 2013, 98; 16.54

O9 R116

C202 Leu Numismatik AG, Auction 81 16th May 2001, 349; Ariadne Galleries, Auction 7 December 1982, 174; 16.71

O9 R124

C285 H. Grün Heidelberger Münzhandlung, Auction 43 10/11 May 2005, 418; 15.57

O9 R136

C276 Kurpfälzische Münzhandlung, Auction 51 December 1996, 138; 16.60

O9 R144

C360 Bank Leu AG Zürich, Auction 18 5 May 1977, 267; 15.92

O9 R182

C117 CNG, MBS 72 14th June 2006, 1025; 16.87

O9 R187

C165 Numismatik Lanz München, Auction 117 24th November 2003, 434; 16.78

O13 R19

C20 Bibliothèque Royale de Belgique, Coll. de Hirsch, 9; 16.84

O25 R46

C53 Gorny & Mosch, Auction 208 16th Oct 2012, 1728; Gorny & Mosch, 134 11th Oct 2004, 1682; 16.45

O25 R54

C66 Gorny & Mosch, Auction 196 7th March 2011, 1941; 16.92

O25 R102

C164 Münzen & Medaillen AG Basel, Auction 93 16th December 2003, 441; 16.80

O25 R121

C325 CNG, MBS 49 17 March 1999, 846; 16.38

O28 R58

C76 Jean Elsen, Vente Publique 35 2nd July 1994, 125; 16.89
C123 Numismatik Lanz München, Auction 125 28th November 2005, 512; Peus, Auction 345 1-3 November 1995, 331; Peus, Auction 351 23-25 April 1997, 447; 17.14
C232 A. Poinsignon Numismatique, FPL 36 November 1993, 423; A. Poinsignon Numismatique, FPL 41 June 1996, 724; A. Poinsignon Numismatique, FPL 42 June 1997, 784; n/a

O28 R59

C77 Jean Elsen, Vente Publique 35 2nd July 1994, 370; Leu Numismatik AG, Zürich Auction 74 19-21 October 1998, 278; 16.79

O28 R97

C150 Gorny & Mosch Auction 134 11th October 2004, 1680; 16.11

O28 R111

C188 Gorny & Mosch, Auction 117 14th October 2002, 341; Leu Numismatik AG, Auction 83 6th May 2002, 432; 16.85

O28 R115

C201 CNG, MBS 58 19th September 2001, 871; CNG, Auction 94 18 September 2013, 835; 16.76

O34 R73

C99 Comptoir Général Financier, MBS 34 30th April 2008, 303; Gorny, Auction 102 24th May 2000, 350; 16.68

O34 R137

C263 Gerhard Hirsch Nachf., Auction 197 26-28 November 1997, 414; 16.74

O34 R162
C314 CNG, MBS 41 19 March 1997, 969; 15.93
O34 R175
C345 Pegasi, BBS 140 2 August 2011, 155; 16.61
O47 R3
C170 Gorny & Mosch, Auction 125 13th October 2003, 264; 17.09
C248 Gorny, Auction 95 9th March 1999, 434; Münzen Auktion Essen, Auction 75 6 May 1998, 293; 16.08
O47 R58
C250 Gorny, Auction 97 11th October 1999, 612; 16.88
C365 Münzen & Medaillen AG Basel, List 452 February 1983, 22; 16.92
O47 R79
C226 UBS Gold & Numismatics, Auction 56 28th January 2003, 173; 16.23
O47 R120
C214 Heritage World Coins Auctions, CICF Signature Sale 3024 18th April 2013; 24715; 16.65
O47 R146
C320 CNG, MBS 47 16 September 1998, 754; 16.76
O47 R163
C317 CNG, MBS 45 18 March 1998, 765; 16.60
O49 R54
C251 Gorny, Auction 100 20th Nov 1999, 224; A. Tkalec AG, Auction 28 Oct 1994, 134; 16.87
O49 R59
C240 Frankfurter Münzhandlung GmbH, Auction 151 1st/2nd June 1999, 67; 16.91
O49 R76
C254 Gorny & Mosch, Auction 104 9th-10th October 2000, 498; 16.50
O49 R95
C147 Gorny & Mosch Auction 134 11th October 2004, 1679; 16.38
O49 R121
C319 CNG, MBS 46 24 June 1998, 621; 16.90
O49 R146
C309 CNG, MBS 34 6 May 1995, 230; 16.72
O49 R148
C286 Dr Jacob Hirsch, Auction 21, 16 November 1908, 4417; 15.93
O49 R197
C392 Sotheby & Co. London, Haughton Collection 1st May 1958, 304; 16.66
O50 R134
C255 Gorny & Mosch, Auction 104 9th-10th October 2000, 499; 15.97
O50 R147
C283 Crédit de la Bourse SA, Auction 12 June 1997, 83; 16.89
O50 R154
C298 Schweizerische Kreditanstalt, Auction 1 22/23 April 1983, 159; Schweizerische Kreditanstalt, FPL 42 Feb. 1984, 70; VC Vecchi & Sons, Auction 11 8th October 1984, 158; 16.10
O52 R91
C179 CNG, Electronic Auction 63 23rd April 2003, 30; 16.40
O52 R126
C279 Lanz München, Auction 66 22 November 1993, 347; 16.56

O52 R140
C267 Gerhard Hirsch Nachf., Auction 205 22-25 Sep 1999, 528; Aï Khanum II 1973, 48; 16.74
O56 R169
C334 Kovacs, MBS XII 30 November 1995, 151; 16.81
O57 R79
C349 Münz Zentrum, Auction 39 16 April 1980, 738; 15.72
C382 Glendining & Co. Ltd, Auction 12th November 1999, 3; 16.6
O57 R173
C341 Pegasi, MBS X 5 May 2004, 222; 16.28
O59 R91
C143 Gorny & Mosch, 134 11th Oct 2004, 1684; P.-F. Jacquier, List 33 Winter 2005, 197; 16.29
O59 R126
C233 Collection J.M. de Costa Rica, 23-24th April 1990, 36; 16.58
O60 R15
C16 *BNBact*, 5; 16.92
O60 R16
C17 *BNBact*, 6; 16.56
O60 R85
C120 CNG, Electronic Auction 133 15th February 2006, 112; 16.40
C171 Spink, Auction 3014 8th October 2003, 105; Glendining & Co. Ltd, Auction 30th January 1997, 44; Sotheby & Co. London, Auction 24 April 1998, 326; 16.81
C358 Aï Khanum II 1973, 49; 16.52
O60 R155
C300 Schweizerischer Bankverein Zürich, Auction 33 20-22 September 1993, 445; 16.74
O60 R185
C126 CNG, MBS 70 21st September 2005, 464; 16.87
O60 R201
C402 CNG, Triton II 1/2 December 1998, 597; 17.00
O61 R10
C299 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 318; 16.72
O61 R89
C133 Gorny & Mosch, Auction 138 7th March 2005, 1566; 16.20
O61 R96
C149 Gorny & Mosch Auction 134 11th October 2004, 1683; 16.53
O61 R186
C302 A. Tkalec AG, Auction 25 October 1996, 93; 16.88
O61 R191
C376 Frank Sternberg Zürich, MBS 1 18th December 1999, 317; 16.78
O62 R76
C104 CNG, Electronic Auction 180 23rd January 2008, 69; 16.70
O62 R136
C260 Dr Jacob Hirsch, Auction 31 6th May 1912, 514; 16.55
O63 R75
C102 Gorny & Mosch, Auction 164 17th March 2008, 271; 16.57
O63 R196
C391 Sotheby, Wilkinson & Hodge, Charles Butler Collection 10th July 1911, 184; n/a

O64 R33
C65 Künker, Auction 182 14th March 2011, 376; 16.72
C98 CNG, Electronic Auction 187 30th April 2008, 86; 16.90
O64 R34
C204 CNG, MBS 57 4th April 2001, 736; 16.88
O64 R38
C154 H.D. Rauch, 73 17th May 2004, 368; 16.76
O64 R39
C44 Colin E. Pitchfork Collection, 94; CNG, MBS 67 22nd September 2004, 1018; 16.94
O64 R59
C132 Künker, Auction 97 7th March 2005, 999; Künker, Auction 89 8th March 2004, 1554; B. Ahlström, Auction 53, 20 April 1996, 1442; 16.31
O64 R94
C146 Gorny & Mosch, 134 11th October 2004, 1685; 16.52
O64 R107
C183 Gorny & Mosch, Auction 121 10th March 2003, 243; 16.97
O64 R146
C282 B. Ahlström, Auction 63, 28-29 April 2001, 1978; n/a
O65 R34
C38 *SNG* ANS, 277; 16.44
O66 R46
C162 Gorny & Mosch, Auction 130 8th March 2004, 1691; 16.53
C245 Gorny, Auction 92 20/21 November 1998, 353; 16.60
O66 R92
C144 Gorny & Mosch, 134 11th October 2004, 1681; 16.55
O66 R139
C266 Gerhard Hirsch Nachf., Auction 206 24-26 November 1999, 280; 16.22
C380 Lennox Gallery Ltd, FPL 2 June 1996, G128; n/a
O67 R24
C27 Qunduz Hoard, 93; 16.77
O68 R87
C128 CNG, Electronic Auction 122 7th September 2005, 176; 16.82
O69 R118
C207 CNG, MBS 57 4th April 2001, 737; 16.89
O69 R124
C228 Baldwin's Auctions Ltd, 26 9th May 2001, 1794; Baldwin, 31 14th/15th Oct 2002, 69; 16.60
O70 R33
C37 *SNG* ANS, 276; Dr Jacob Hirsch, Auction 25 29th November 1909, 3139; 16.87
O71 R26
C30 Qunduz Hoard, 96; 16.26
O72 R82
C29 Qunduz Hoard, 95; 16.59
O74 R3
C339 Dmitry Markov Coins & Medals, MBS 10 23 October 2001, 206; 15.73

O74 R46
C88 Künker, Auction 158 28th Sept 2009, 357; Hauck & Aufhäuser, 21 17th Mar 2009, 220; 16.97
C316 CNG, MBS 45 18 March 1998, 764; 16.76
C398 Senior Consultants, List Autumn 1998, 12; n/a
O74 R47
C85 Ponterio & Associates, Sale 152 - NYINC Auction 8th January 2010, 5912; Gorny & Mosch, Auction 122 10th March 2003, 1562; 16.99
O74 R121
C215 Heritage World Coins Auctions, New York Signature Sale 3021 6th January 2013, 21285; Gorny, Auction 97 11th October 1999, 611;16.93
C303 Antiqua, FPL 15, 2009, 47; 16.81
C338 Dmitry Markov Coins & Medals, MBS 10 23 October 2001, 205; 16.61
O74 R152
C295 Münzen Auktion Essen, Auction 75 6 May 1998, 295a; n/a
O79 R167
C326 CNG, MBS 49 17 March 1999, 847; 16.24
O79 R188
C370 Alpha Bank Numismatic Collection, 4104; 16.85
O81 R192
C381 Galata Coins Ltd & Paul Withers, FPL July 1976, 38; n/a
O84 R34
C271 P.-F. Jacquier, List 17 Autumn 1995, 196; 16.46
O84 R109
C186 Gorny & Mosch, Auction 121 10th March 2003, 244; 17.08
O85 R25
C321 CNG, MBS 47 16 September 1998, 755; 16.05

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O89 R35
C39 *SNG* ANS, 278; 16.38
O90 R68
C90 H.D. Rauch, Summer Auction 17th September 2009, 394; 16.24

Group IIIb (⍜)

O88 R194
C388 Italo Vecchi Ltd London, Auction 2 13th September 1996, 618; 16.01

Group IV(⍀)

O4 R5
C5 BM, 1888.1208.124; 16.04
C93 Spink, Auction 9008 19th March 2009, 371; 16.90
O4 R18
C19 *BNBact*, 8; 16.89

O4 R41

C48 Noble Numismatics Pty Ltd, Auction 88, 3964; Noble Numismatics Pty Ltd, Auction 90 31st March 2009, 3313; Gorny & Mosch, Auction 130 8th March 2004, 1694; Pegasi, MBS XI 19 October 2004, 239; 16.77

C284 Feuardent, Auction 17-19 December 1919, 421; n/a

O4 R83

C223 NAC, Auction P 12th May 2005, 1603; 16.95

O4 R100

C158 Gorny & Mosch, Auction 130 8th March 2004, 1692; 16.64

O4 R101

C160 Gorny & Mosch, Auction 130 8th March 2004, 1693; 16.18

O4 R110

C187 CNG, Electronic Auction 56 18th December 2002, 66; 16.27

O4 R130

C242 Gorny, Auction 81 3rd Mar 1997, 441; Gorny, Auction 84 13th October 1997, 5439; 16.83

O4 R143

C347 Münz Zentrum, Auction 39 16 April 1980, 736; Adolph Hess AG Luzern, Auction 251 7/8 May 1981, 135; 16.10

O4 R158

C305 Berk, BBS 71, 28 May 1992, 197; n/a

C348 Münz Zentrum, Auction 39 16 April 1980, 737; 16.40

O30 R67

C87 Künker, Auction 158 28th September 2009, 358; Gerhard Hirsch Nachf., Auction 208 17-19 February 2000, 1912; 15.65

O37 R81

C115 CNG, Electronic Auction 150 18th October 2006, 184; 16.77

O37 R141

C268 Gerhard Hirsch Nachf., Auction 223 26-28 September 2002, 1943; 16.01

O37 R161

C313 CNG, MBS 41 19 March 1997, 968; 15.57

O37 R164

C318 CNG, MBS 46 24 June 1998, 620; Senior Consultants, List February 1996, 18; 16.54

O37 R172

C106 CNG, Electronic Auction 175 24th October 2007, 150; 16.70

C340 Dmitry Markov Coins & Medals, MBS 10 23 October 2001, 207; 16.19

O40 R83

C118 CNG, MBS 72 14th June 2006, 1026; Leu Numismatik AG, Auction 91 10th May 2004, 202; Peus, Auction 351 23-25 April 1997, 446; 16.68

C153 CNG, MBS 66 19th May 2004, 950; 16.84

C237 Bankhaus Aufhäuser, Auction 10 5-6 October 1993, 304; 16.93

O43 R100

C366 NAC, Autumn Sale 95 26/27 October 1995, 251; n/a

O43 R106

C182 Gorny & Mosch, Auction 122 10th March 2003, 1565; 16.42

O43 R110

C389 Italo Vecchi Ltd London, Auction 14 5th February 1999, 705; 15.95

O43 R143
C273 H. H. Kricheldorf, Auction 22 11/12 February 1971, 153; n/a
O44 R80
C114 Numismatica Genevensis SA, Auction 4 11th December 2006, 110; CNG, Triton VI 14th January 2003, 533; 16.97
C249 Gorny, Auction 95 9th March 1999, 435; Münzen Auktion Essen, Auction 75 6 May 1998, 295b; 16.20
O48 R64
C83 Numismatik Lanz München, Auction 149 24th June 2010, 277; 16.91
C151 Künker, Auction 94 27th September 2004, 1524; Auctiones AG, Auction 29 12th June 2003, 775; 16.76
O53 R193
C384 C.J. Martin (Coins) Ltd, Vol XX No. 3 August 1993, G93; n/a
O55 R5
C306 Berk, BBS 80, 18 January 1994, 282f; German Private Collection, 45; n/a
O55 R106
C312 CNG, Auction 40 4 December 1996, 1131; 16.92
O78 R72
C97 CNG, MBS 78 14th May 2008, 1021; 16.91
O78 R123
C220 Oslo Mynthandel, Auction 1st Apr 2000, 1327; NAC, Auction 51 5th Mar 2009, 676; 16.75

Imitation ()

O2 R2
C2 BM, 1850.0412.124; 16.55
O2 R14
C15 *BNBact*, 4; 16.53
O2 R117
C203 Peus, Auction 368 25th April 2001, 409; Peus, Auction 361 3-6 Nov 1999, 362; 16.93
O2 R125
C229 Bourgey, Nouveau Drouot 10th-11th June 1982, 161; 16.15
O6 R7
C7 Ashmolean, 39, H. De S. Shortt Bequest 1975; 16.85
O6 R27
C31 Qunduz Hoard, 97; 16.74
O6 R45
C52 CNG, Triton XVI 8th January 2013, 643; 16.90
O6 R142
C272 H. H. Kricheldorf, Auction 5 20/21 October 1958, 143; 15.21
O6 R157
C304 Ariadne Galleries, Auction 9 December 1981, 308; Sotheby, Wilkinson & Hodge, Charles Butler Collection Auction 10th July 1911, 185; 16.90
O6 R179
C359 Bank Leu AG Zürich, Auction 13 29/30 April 1975, 324; 16.74
O6 R180
C363 Leu Numismatik AG, Zürich Auction 72 12 May 1998, 376; 16.89

O6 R198
C394 Sotheby & Co. London, Auction 23rd May 1979, 54; Spink Coin Auctions, Auction 15 15 May 1981, 66; n/a
O80 R190
C375 Schweizerische Kreditanstalt, Auction 7 27th April 1987, 309; 16.89
O82 R156
C301 Sotheby & Co. Zürich, Auction 27 May 1974, 323; VC Vecchi & Sons, FPL 12 Undated, 47; Sotheby Parke Bernet A.G. Zürich, Auction 10th June 1977, 199; 16.69

Method	D_o	±	D_r	D_r/D_o	W
Carter	81	1.7	309	3.8	1.75
Good	73.4		277.1	3.8	
Esty, 1986	82.8		362.6	4.4	
Esty, 2011	85.2	5.7	380.2	4.5	1.81

AR Drachms

Obv. As above.
Rev. As above.

Group I (P)

O1 R1
C1 BM, 1888.1208.125; 4.11
C34 Freeman & Sear, MBS 13 25th August 2006, 278; 4.20
C36 Gorny, Auction 76 22nd April 1996, 281; 4.22
C59 Kirk Davis, BBS 44 Spring 2004, 68; 4.20
O1 R15
C16 Hess-Divo AG, Auction 317 27th October 2010, 332; 4.05
C27 Gorny & Mosch, Auction 142 10th October 2005, 181; Gorny & Mosch, Auction 134 11th October 2004, 287; H.D. Rauch, Auction 73 17th May 2004, 369; 4.23
C30 CNG, Electronic Auction 84 3rd March 2004, 96; 4.13
O1 R18
C19 CNG, Electronic Auction 225 13th January 2010, 194; 3.98
O1 R33
C53 Peus, Auction 351 23-25 April 1997, 448; 4.20
O1 R34
C54 Baldwin, Auction 33 6th/7th May 2003, 72; 4.3

O5 R8

C8 *SNG* ANS, 279; 3.91

C41 Berk, BBS 90, 17 April 1996, 183a; n/a

C50 Peus, Auction 345 1-3 November 1995, 333; 4.23

C56 Senior Consultants, List February 1996, 19; n/a

O5 R16

C17 Fitzwilliam Museum, McClean Bequest, 9689; 3.60

O5 R19

C20 Ira & Larry Goldberg, Auction 53 24th May 2009, 1714; Baldwin's Auctions Ltd, Auction 44 2nd May 2006, 111; 4.21

O5 R27

C40 Berk, BBS 90, 17 April 1996, 183; n/a

C52 Peus, Auction 349 2 November 1996, 271; 4.18

Group III (Ⓝ)

O2 R2

C2 BM, 1888.1208.126; 4.19

C31 Peus, Auction 372 30th October 2002, 759; 4.08

O2 R3

C3 BM, *BMC* 4; 3.78

O2 R5

C5 Ashmolean, Hollis Collection; 4.11

C25 CNG, Triton IX 10th January 2006, 1122; 4.28

C45 CNG, MBS 41 19 March 1997, 971; 4.26

O2 R14

C15 Hess-Divo AG, Auction 317 27th October 2010, 331; 3.78

O2 R29

C43 CNG, MBS 38 6/7 June 1996, 505; 4.26

O3 R4

C4 Ashmolean, H. De S. Shortt Bequest 1975; 3.59

O3 R6

C6 *BNBact*, 9; 3.83

O3 R30

C47 CNG, MBS 51 15 September 1999, 706; 4.13

O4 R3

C57 Senior Consultants, List February 1996, 20; n/a

O4 R4

C22 Stack's, Stack & Kroisos Collections 14th January 2008, 2319; Kirk Davis, BBS 57 Spring 2010, 41; 4.04

C24 CNG, MBS 75 23rd May 2007, 635; 4.04

C38 Gorny, Auction 97 11th October 1999, 613; 3.66

O4 R5

C46 CNG, Triton I 2/3 December 1997, 616; 4.21

C61 German Private Collection, 48; 3.5

O4 R7
C7 *BNBact*, 10; 3.81
C14 ArtCoins Roma, Auction 3 31st May 2011, 116; 4.20
C26 CNG, Electronic Auction 124 12th October 2005, 152; 4.14
O4 R23
C29 Gorny & Mosch, Auction 129 8th March 2004, 204; 4.10
O4 R25
C37 Gorny, Auction 95 9th March 1999, 436; 3.61
O6 R6
C32 A. Tkalec AG, Auction 25 October 1996, 94; 4.24
O6 R9
C9 *SNG* ANS, 280; 4.15
C44 CNG, MBS 38 6/7 June 1996, 506; CNG, MBS 45 18 March 1998, 766; 4.04
O6 R20
C60 German Private Collection, 47; 3.7
O7 R10
C10 *SNG* ANS, 281; 3.58
O7 R12
C12 *SNG* Lockett Collection, 3355; 4.00
O9 R20
C21 Spink, Auction 8012 26th June 2008, 22; 3.85
O11 R22
C28 Gorny & Mosch, Auction 138 7th March 2005, 1567; Peus, Auction 374 23rd April 2003, 196; 4.09
C33 A. Tkalec AG, Auction January 2000 29th February 2000, 198; 4.24
O11 R24
C35 Gorny, Auction 76 22nd April 1996, 280; 4.13
O13 R28
C42 CNG, MBS 38 6/7 June 1996, 504; 4.04
C48 Pegasi, BBS 143 19 March 2013, 170; 3.79
O13 R31
C49 Peus, Auction 323 1-4 November 1988, 1006; 4.15
O13 R32
C51 Peus, Auction 345 1-3 November 1995, 334; 3.83

Group IV (⋈)

O8 R11
C11 *SNG* ANS, 282; 3.88
O8 R13
C13 Künker, Auction 193 26th September 2011, 306; 4.20
O8 R17
C18 CNG, Electronic Auction 227 10th February 2010, 226; 4.14
O12 R13
C55 RC Senior Ltd, List 1 1981, 15; n/a
O12 R17
C58 Senior Consultants, List February 1996, 21; n/a

O12 R26
C39 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 319; 3.85

Method	D_o	±	D_r	D_r/D_o	W
Carter	15.7	0.9	62.2	4	1.38
Good	13.4		48.2	3.6	
Esty, 1986	14.5		61	4.2	
Esty, 2008	16.5	3.1	76.8	4.7	1.43

AR Hemidrachms

Obv. As above.
Rev. As above.

Group I (𐤊)

O1 R1
C1 BM, 1983.0817.10; 1.95
O1 R3
C3 Peus, Auction 345 1-3 November 1995, 335; 2.07
O1 R4
C4 Ashmolean, Hollis Collection; 2.08

Group V (𐤍)

O2 R2
C2 BM, EIC 33; 2.03

AR Obols

Group I (𐤊)

O2 R2
C2 BM, India Office Collection 19; 0.65
C41 CNG, Electronic Auction 64 7th May 2003, 202; 0.67
O2 R9
C10 *SNG* ANS, 283; 0.68
O2 R21
C22 Gorny & Mosch, Auction 204 5th March 2012, 1654; Gorny & Mosch, Auction 191 11th October 2010, 1677; Numismatik Lanz München, Auction 74 20 November 1995, 299;0.70
C28 CNG, Electronic Auction 212 17th June 2009, 149; 0.67

O2 R48
C55 Kirk Davis, BBS 16 2nd December 1996, 86; 0.66
O5 R5
C6 Ashmolean, Given Mrs Showers 29/12/1916; 0.58
O6 R6
C7 Ashmolean, Oman 1947; 0.51
O6 R10
C11 *SNG* ANS, 284; 0.64
O6 R11
C12 *SNG* ANS, 285; 0.63
O6 R27
C29 CNG, Electronic Auction 187 30th April 2008, 88; 0.68
O6 R32
C34 CNG, Electronic Auction 131 18th January 2006, 110; 0.68
O6 R39
C45 Schweizerischer Bankverein Zürich, Auction 43 15-17 September 1997, 217; 0.68
O6 R47
C54 Galerie Antiker Kunst, List 5 December 1987, 15; 0.65
O7 R7
C8 *BNBact*, 11; 0.66
O7 R20
C21 Ira & Larry Goldberg, Auction 70 4th September 2012, 3151; 0.70
C48 CNG, MBS 38 6/7 June 1996, 508; 0.70
O8 R8
C9 *BNBact*, 12; 0.64
O9 R12
C13 *SNG* ANS, 286; 0.61
O9 R13
C14 *SNG* ANS, 287; 0.61
O9 R14
C15 *SNG* ANS, 288; 0.51
O9 R22
C23 Ira & Larry Goldberg, Auction 67 31st January 2012, 3226; 0.72
O9 R25
C26 Gorny & Mosch, Auction 191 11th October 2010, 377; A. Tkalec AG, Auction 25 October 1996, 95; 0.70
C56 German Private Collection, 49; 0.7
O9 R33
C37 CNG, Electronic Auction 122 7th September 2005, 177; 0.69
O9 R40
C46 CNG, MBS 37 20 March 1996, 812; 0.69
O9 R45
C52 Pegasi, BBS 142 21 August 2012, 164; 0.57
O14 R19
C20 Museum of Fine Arts, Boston, 2240; 0.60
O17 R26
C27 CNG, Electronic Auction 213 1st July 2009, 194; 0.68

O17 R34
C39 Spink, Auction 4013 15th July 2004, 185; n/a
O18 R28
C30 CNG, Electronic Auction 184 19th March 2008, 81; 0.68
C35 Gorny & Mosch, Auction 142 10th October 2005, 182; 0.67
O18 R30
C32 Gorny & Mosch, Auction 156 5th March 2007, 1574; 0.67
O18 R49
C57 German Private Collection, 52; 0.7
O19 R29
C31 CNG, Electronic Auction 179 2nd January 2008, 120; 0.69
O20 R31
C33 CNG, Electronic Auction 158 14th February 2007, 69; 0.69
O20 R46
C53 World Numismatic Auctions, Auction 1 1 December 2007, 448; 0.66
O21 R21
C36 Heritage, Long Beach Signature Sale 387 23rd September 2005, 12084; 0.68
C38 Comptoir Général Financier, MBS 24 24th June 2005, 139; 0.67
O21 R35
C40 Numismatik Lanz München, Auction 117 24th November 2003, 435; 0.68
O22 R36
C42 Gorny & Mosch, Auction 122 10th March 2003, 1567; 0.70
O24 R38
C44 Schweizerischer Bankverein Zürich, Auction 43 15-17 September 1997, 216; 0.70
O24 R41
C47 CNG, MBS 38 6/7 June 1996, 507; 0.69
O25 R42
C49 CNG, MBS 38 6/7 June 1996, 509; 0.71
O26 R43
C50 CNG, MBS 38 6/7 June 1996, 972; 0.70
O27 R44
C51 Pegasi, MBS XXIV 5 April 2011, 243; 0.58

Group III (Ⓝ)

O1 R1
C1 BM, 1983.0529.2; 0.55
O10 R15
C16 *SNG* ANS, 289; 0.58
O11 R16
C17 *SNG* ANS, 290; 0.52
O29 R17
C18 *SNG* ANS, 291; 0.31
O30 R24
C25 Hess-Divo AG, Auction 317 27th October 2010, 334; 0.50

O31 R37
C43 Peus, Auction 280 30 October 1972, 241; 0.57
O32 R5
C5 Ashmolean, Hollis Collection; 0.58

Group IV (𐤀)

O15 R4
C4 BM, 1904.0407.23; 0.71
O15 R23
C24 Hess-Divo AG, Auction 317 27th October 2010, 333; 0.68
O28 R18
C19 *SNG* ANS, 292; 0.59

Group VI (𐤊)

O3 R3
C3 BM, 1888.1208.127; 0.57

Method	D_o	±	D_r	D_r/D_o	W
Carter	41.7	4.9	264.9	6.4	1.19
Good	38.5		199.5	5.2	
Esty, 1986	50.6		287	5.7	
Esty, 2011	51.3	3.4	349.1	6.8	1.24

AE ‘Double units’

Obv. Elephant walking, right.
Rev. Nike walking left with palm in left hand and wreath in right. ΒΑΣΙΛΕΩΣ / ΑΝΤΙΜΑΧΟΥ.

Group I (Ρ)

O2 R2
C2 BM, 1922.0424.2890; 6.71
O3 R3
C3 BM, 1888.1208.128; 6.58
O3 R8
C9 CNG, MBS 63 21st May 2003, 935; 7.73
O4 R4
C4 Ashmolean, Bought Seaby 1977, 130b; 7.35
O4 R10
C12 Gorny & Mosch, Auction 181 12th October 2009, 1584; CNG, Electronic Auction 149 4th October 2006, 149; P.-F. Jacquier, List 35 Summer 2007, 268; 7.92
O5 R5
C5 Ashmolean, Hollis Collection; 7.25
O7 R9
C10 Hess-Divo AG, Auction 317 27th October 2010, 335; 7.40
O8 R11
C13 CNG, Electronic Auction 165 30th May 2007, 96; 7.99
O8 R13
C15 CNG, Triton VIII 11th January 2005, 641; 8.17
O9 R14
C16 CNG, Electronic Auction 84 3rd March 2004, 97; 7.68
O10 R15
C17 CNG, MBS 60 22nd May 2002, 1110; 7.97
C18 CNG, MBS 57 4th April 2001, 740; 6.54
O12 R17
C20 Pegasi, MBS XIII 8 November 2005, 245; 7.90
O13 R18
C21 Münz Zentrum Rhineland, Auction 143 16/17 April 2008, 146; 7.78
O14 R19
C22 German Private Collection, 54; 7.9

Group VII (ΑΡ)

O1 R1
C1 BM, 1887.0605.7; 8.48
C6 *BNBact*, 13; 7.87

O1 R6
C7 *SNG* ANS, 293; 7.62

Group VIII (Φ|)

O6 R7
C8 *SNG* ANS, 294 ;7.34
C11 CNG, Triton XIII 5th January 2010, 1368; 7.73
O6 R12
C14 Spink, Auction 5014 28th September 2005, 211; 8.27
O11 R16
C19 Schweizerische Kreditanstalt, Auction 2 27/28 April 1984, 323; 8.28

AE 'Large module'

Obv. Elephant walking.
Rev. Thunderbolt. ΒΑΣΙΛΕΩΣ / ΑΝΤΙΜΑΧΟΥ.

Elephant to left

O1 R1
C1 CNG, Auction 87 18th May 2011, 734; 11.00
O1 R3
C4 German Private Collection, 56; 12.5
O3 R4
C5 Ashmolean, H. De S. Shortt Bequest 1975; 9.13
O4 R1
C6 Ashmolean, Hollis Collection; 10.58
O5 R5
C7 Ashmolean, Hollis Collection; 10.0

Elephant to right

O2 R2
C2 Alpha Bank Numismatic Collection, 8735; 10.84
C3 German Private Collection, 55; 12.7
O6 R6
C8 Ashmolean, Hollis Collection; 11.40

AE ‘Small module’

Obv. As above.
Rev. As above.

Elephant to right

O1 R1
C1 BM, 1954.0211.1; 2.16
O2 R2
C2 *BNBact*, 14; 2.82
O3 R3
C3 *BNBact*, 15; 2.80
O3 R4
C4 *BNBact*, 16; 2.41
C5 *SNG* ANS, 295; 2.01
O3 R6
C7 Ashmolean, Hollis Collection; 2.81
O4 R5
C6 CNG, Electronic Auction 260 20th July 2011, 320; 2.69

Appendix B: Forgeries

The problem of modern copies of ancient coins is not a new one, but has become more significant in recent decades with the use of increasingly sophisticated techniques. A number of groups of forgeries of Graeco-Bactrian and Indo-Greek coins have been identified in the past.[463] The work of one forger, active in the 1940s, is linked to the area of Utmanzai in north-western Pakistan.[464] The publication of this group unfortunately focused on the Indo-Greek drachms produced by the forger, with only brief mentions made of Attic standard 'Bactrian' tetradrachms.[465] Another group of forgeries, coins from the Seleucid period and early Graeco-Bactrian kingdom was identified by Jenkins.[466] The circumstances of the production of these coins was less clear, with some examples dating from the late nineteenth century and it is quite possible that coins of later kings were also produced.

As the value of the coins has increased so has the scale of forgery. In 2008 at least 164 coins of Graeco-Bactrian rulers, said to have come from a hoard in Afghanistan, were identified as forgeries.[467] A number of these coins appeared with a 'thick encrustation of silver sulphide' on their surface, while others had been cleaned to varying degrees. Again the circumstances of the production of these coins are not known. What is clear is the scale of the problem. The most notable instance of the difficulty posed by such forgeries is the unique 'Alexander Medallion', the inauthenticity of which is now beyond doubt.[468] As Robert Bracey has put it, in reference to this famous coin, 'someone in Peshawar (the likely source) is brilliant and lucky, and is reading our articles'.[469] Not only is this knowledge being used in the production of unique coins that major numismatic gaps, such as the lifetime portrait of Alexander, but, from the evidence of the current study, it seems to be being put to use by providing new, or unexpected monograms, for example.

[463] For a discussion of the various types of forgeries see Mitchiner (1976), vol. 4, 381-383.
[464] Shortt (1963).
[465] Shortt (1963), 22.
[466] Jenkins (1965).
[467] Bracey (2008).
[468] See the collected arguments in Callataÿ (2013a).
[469] Bracey (2011), 491.

A substantial number of coins were omitted from the die study due to concerns of authenticity. Since space is limited, it is not possible to include the reasons for each omission. A brief list of the main criteria is included below, with the majority of coins exhibiting one or more:

a) Underweight. Many coins were omitted because of a lower than usual weight (often in the range of 14 to 16g for tetradrachms), although always in addition to another criterion.
b) An out of place monogram (again only used to condemn a coin when identified in conjunction with other suspicious features).
c) A lack of definition on the coin.
d) A 'simple' style to the obverse portrait or features of the reverse type. Such a feature is the most subjective of all the criteria, unfortunately often attributable only to a gut instinct, but often found on underweight coins.
e) A poorly engraved legend. The letters of genuine coins are invariably well executed.
f) Die links. A lack of links for a suspicious example to other coins outside a group can lead to condemnation, whether the coin is a singleton, or part of a larger group which were all struck with the same obverse and reverse die.

The list below should not be considered a final condemnation of a coin since I was unable to examine any in person. Obviously modern coins, including those sold as such, have been omitted.

Euthydemus I

Tetradrachms

C1 Künker Auction 216 8th October 2012, 547; Gorny Auction 89 5th May 1998, 290; Gorny Auction 90 12/13 October 1998, 517; 16.52

C2 CNG Electronic Auction 246 15th December 2010, 181; 16.14

C3 CNG Triton VI 14th January 2003, 531; 16.49

C4 Italo Vecchi Ltd London Auction 16 9th October 1999, 305; 16.19

C5 Gorny & Mosch Auction 207 15th October 2012, 456; 16.57

Drachm

C1 CNG Electronic Auction 141 7th June 2006, 126; CNG Electronic Auction 91 9th June 2004, 87; 3.90

Demetrius I

Drachm

C1 German Private Collection; 3.3

Euthydemus II

Tetradrachms

C1 Baldwin's Auctions Ltd The New York Sale XVII 9th January 2008, 128; 15.61

C2 CNG MBS 60 22nd May 2002, 1104; 13.44

Agathocles

'Pedigree' tetradrachms

C1 CNG MBS 75 23rd May 2007, 629; CNG 20th May 2009, 677; 15.81

C2 CNG MBS 75 23rd May 2007, 630; CNG 20th May 2009, 678; 14.28

C3 Gorny & Mosch Auction 156 5th March 2007, 1571; 14.01

C4 J. Schulman Auction 24 November 1913 (Collection de Mr Le Dr M.A. Kreling), 792; 19.87

C5 J. Schulman Auction 24 November 1913 (Collection de Mr Le Dr M.A. Kreling), 794; 16.20

Antimachus I

Tetradrachms

C1 CNG MBS 81 20th May 2009, 679; 16.89

C2 CNG MBS 81 20th May 2009, 680; CNG MBS 75 23rd May 2007, 634; 16.33

C3 CNG MBS 78 14th May 2008, 1022; 16.00

C4 CNG MBS 75 23rd May 2007, 633; 16.89

C5 Gorny & Mosch Auction 155 5th March 2007, 168; 15.88

C6 CNG MBS 31 9/10 September 1994, 550; 16.79

C7 Auctiones A.G., Basel Auction 24 23/24 June 1994, 372; 16.01

C8 Senior Consultants List Summer 1999, 27; n/a

Obol

C1 Gorny & Mosch Stuttgart Auction 1 22nd November 2010, 304; 0.96

A Graeco-Bactrian die?

In 2011 Bopearachchi published a short article presenting 'deux documents exceptionnels en numismatique indo-grecque'.[470] One was a square gold coin purported to be of a previously unknown Indo-Greek king, Heliodotus. The second item was equally unique: a reverse tetradrachm die of Demetrius I with the monogram (**fig. 136**). This artefact would be the only known Graeco-Bactrian or Indo-Greek die still in existence. In fact, very few dies survive from the whole of the ancient world.[471] According to Bopearachchi's information the die was found at Aï Khanum. Such a provenance clearly has important implications for the understanding of monograms, and would finally allow a geographical location to be assigned to one.

There are, however, quite a few problems with the identification of this object as a genuine tetradrachm die of Demetrius I. Comparing the engraved surface of the die with the 'trentaine' of known Demetrius tetradrachms with the correct monogram, Bopearachchi was not able to find a coin that had been struck by this die. Of the 102 tetradrachms in the current study with the relevant monogram, I have also been unable to identify any coins as the product of this die. Although the photographs of the die itself are not always particularly clear, one feature of the placement of the monogram, with one of its terminating lines almost touching the upsilon of the king's name, is very distinctive. I remain confident that if a coin struck from this die were to appear it would be quite simple to identify. The lack of a coin produced by this die may be, as Bopearachchi suggests, simply because the die broke early in its use, but it does not explain why it was not completely destroyed. In many ways the dies were the most important piece of equipment at the mint, and would have had the highest value to potential forgers, who, if they were able to get hold of genuine

[470] Bopearachchi (2011).
[471] Vermeule (1954).

dies, would be in a position to pass off coins with a lower precious metal content as official issues. Immediate destruction of old dies, then, is probably the most important factor in the very small number of ancient dies that remain in existence.

In some cases ancient dies that we do have were themselves forgers' dies. The die found at Herakleion as part of an underwater archaeological excavation and published by Meadows is an interesting example. This die is of a noticeably different shape from the Demetrius example. It is an 'irregular cube' through which the force of the hammer blow would be directed straight down onto the

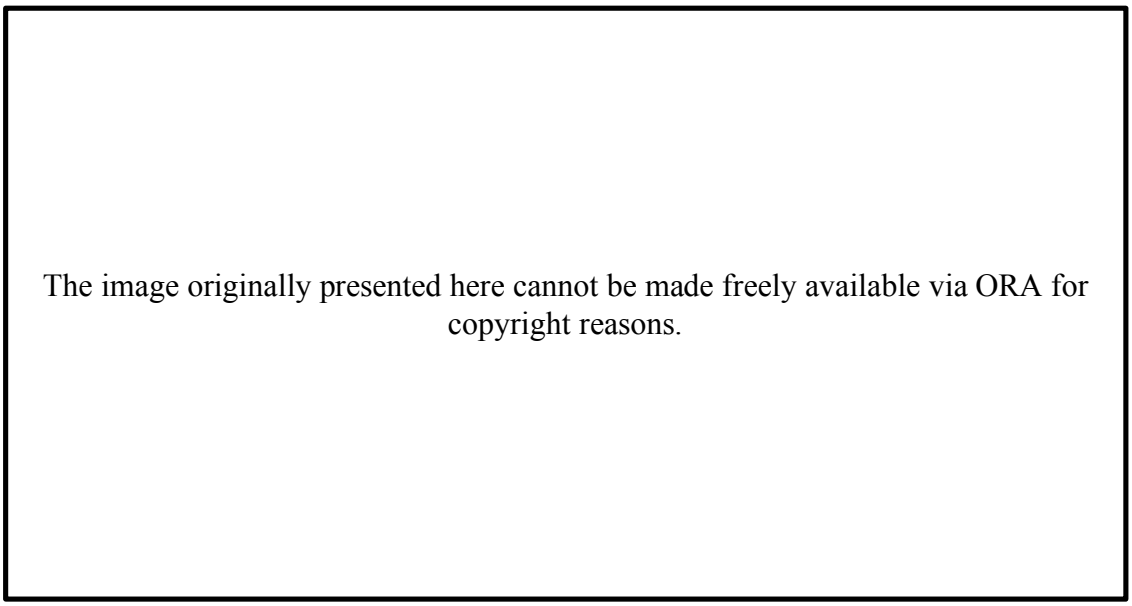

Figure 136: 'Reverse die' of Demetrius Group II tetradrachms first published in Bopearachchi (2011). Image from CNG Auction 91 19th September 2012, 423.

surface of the blank.[472] The sides of the Bactrian die are quite different, being concave in shape, an indication that the die was held in place with tongs, according to Bopearachchi. This shape, however, is particularly inefficient and lends itself to damaging the die quickly as the force of the hammer blow would have compressed the top of the object and the sides of the die would have offered little resistance because of their curved shape.

In Bopearachchi's initial presentation of the 'die' it was indicated that a forthcoming publication would give further details of the object and include an analysis of the metal.[473] Such information is eagerly awaited. It seems that the tests were undertaken by Maryse Blet-Lemarquand using 'scanning electron microscopy

[472] Meadows (2011), 116.
[473] Bopearachchi (2011), 4.

energy-dispersive X-ray analysis'.[474] The results were briefly remarked upon by Holt, '[the die] is made of heterogeneous bronze, containing 78.4-84.2 per cent copper, 15.3-21.1 per cent tin, and a trace of iron.'[475] With no other Graeco-Bactrian dies with which to compare these figures, they are of little use. They may indicate that the metal of the object is, indeed ancient, but such a finding does not mean that the 'die' itself is genuine. It has recently been suggested that the 'Alexander medallion' in fact a modern forgery made from melted-down ancient (Kushan) gold coins.[476] The use of ancient metal in the production of these unique objects is a worrying development and is presumably thought of by the producers of these artefacts as a way of deflecting concerns about authenticity. With such major doubts it is best to omit this 'die' from the historical record, at least until genuine Demetrius tetradrachms struck from it have been identified.

[474] Holt (2012), 281, n.22.
[475] Holt (2012), 166.
[476] Bracey (2011), 491-494.

Abbreviations

AAASH	*Acta antiqua Academiae Scientiarum Hungaricae*
AJA	*American Journal of Archaeology*
AJN	*American Journal of Numismatics*
ANS	American Numismatic Society
ANSMN	*American Numismatic Society Museum Notes*
AnW	*The Ancient World*
AWE	*Ancient West and East*
BCH	*Bulletin de correspondance hellenique*
BM	British Museum
BMC	*British Museum Catalogue*
BNBact	Bopearachchi, O. (1991), *Monnaies gréco-bactriennes et indo-grecques: catalogue raisonné*
BNJ	*British Numismatic Journal*
BSOAS	*Bulletin of the School of Oriental and African Studies*
CA	*Classical Antiquity*
CAH	*Cambridge Ancient History*
CahN	*Cahiers Numismatiques. Bulletin de la Société d'Études Numismatiques et Archéologiques.*
CNG	Classical Numismatic Group, Inc.
CQ	*Classical Quarterly*
CRAI	*Comptes-rendus de l'Académie des Inscriptions et Belles-Lettres*
DAFA	Délégation archéologique française en Afghanistan
E&W	*East and West*
IGCH	*Inventory of Greek Coin Hoards*
IT	*Indologica Taurinensia*
JASB	*Journal of the Asiatic Society of Bengal*
JBORS	*Journal of the Bihar and Orissa Research Society*
JHS	*Journal of Hellenic Studies*
JIAN	*Journal international d'archéologie numismatique*
JNSI	*Journal of the Numismatic Society of India*
JONS	*Journal of the Oriental Numismatic Society*

JRAS	*Journal of the Royal Asiatic Society of Great Britain and Ireland*
JRS	*The Journal of Roman Studies*
JS	*Journal des Savants*
LIMC	*Lexicon Iconographicum Mythologiae Classicae*
MDAFA	*Mémoires de la Délégation Archéologique Française en Afghanistan*
NAC	Numismatica Ars Classica
NAC	*Quaderni ticinesi. Numismatica e antichità classiche*
NAJN	*North American Journal of Numismatics*
NC	*Numismatic Chronicle*
NR	*Numismatic Review*
OGIS	*Orientis Graeci Inscriptiones Selectae*
ONSN	*Oriental Numismatic Society Newsletter*
Seleucid Coins	Houghton, A. *et al.* (2002, 2008), *Seleucid Coins: A Comprehensive Catalogue*
SM	*Schweizer Münzblätter*
SNG	*Sylloge Nummorum Graecorum*
SNR	*Schweizerische Numismatische Rundschau*
RA	*Revue Archéologique*
RALouvain	*Revue des archéologues et historiens d'art de Louvain*
RBN	*Revue Belge de Numismatique*
RM	*Römische Mitteilungen*
RN	*Revue Numismatique*
TAPA	*Transactions and Proceedings of the American Philological Association*
ZfN	*Zeitschrift für Numismatik*
ZPE	*Zeitschrift für Papyrologie und Epigraphik*

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