



Astragaloi on Greek Coins of Asia Minor

Richard H.J. Ashton

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ASTRAGALOI ON GREEK COINS OF ASIA MINOR [1]

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ABSTRACT

Astragaloï appear frequently on Greek coins as one of a range of subordinate symbols, which demarcate individual issues within larger series. More significant are the rarer cases where *astragaloï* appear as the main type, or as an invariable or regular sub-type. Within Asia Minor such cases are confined, with few exceptions, to a region stretching from Cilicia/Cyprus to Lycia, and to a cluster of cases in and near western Ionia, where the common denominator seems to be proximity to the oracle at Claros. In both regions astragalomancy is attested in other sources. Most of the coins concerned date from the late fifth to the early third centuries BCE, especially the first half of the fourth century; then there is a gap until the Severan period and later when several cities depict on coins children playing *astragaloï* before a cult-statue. In both regions *astragaloï* usually appear as main types on small silver denominations and on bronze coins, and not on larger silver denominations. Both phenomena at present elude convincing explanation.

At Kalchedon on the Bosphorus, which had an oracle of Apollo, an *astragalos* appears as the main obverse type on some small, rare, fourth century bronzes. In general, given that almost all occurrences of *astragaloï* on coins as main

types or invariable symbols belong to regions where astragalomancy is attested from other sources, in the much rarer cases where *astragaloï* feature prominently on coins of cities (e.g. Antandros in the Troad) where there is no other evidence for astragalomancy, it could be profitable for historians and archaeologists to keep an alert eye open for it.

KEYWORDS

Antandros,
astragaloï,
astragalomancy,
Cilicia,
Cyprus,
Ionia,
Kalchedon,
Klaros,
Lycia,
Pamphylia,
Pisidia.

Les astragales se trouvent fréquemment sur les monnaies grecques, aux côtés d'autres symboles subordonnés servant à démarquer les étapes successives d'une émission particulière. Beaucoup plus significatifs sont les cas rares où l'astragale est le type principal ou un type secondaire qui est invariable ou régulier. En Asie mineure de tels cas se limitent, presque sans exception, à la région qui va de Chypre/Cilicie jusqu'en Lycie, et à un groupe de villes en Ionie occidentale et ses alentours qui se distinguent par leur proximité au centre oraculaire de Claros. En ce qui concerne ces deux régions, l'astragalomancie est attestée dans d'autres sources.

La plupart des émissions monétaires s'échelonnent entre la fin du V^e et le début du III^e siècle av. J.-C., avec un nombre plus élevé dans la première moitié du IV^e siècle av. J.-C. ; à une pause jusqu'au temps des Sévères succède une période pendant laquelle plusieurs cités représentent sur leurs monnaies des enfants jouant aux astragales devant une statue de culte. Dans les deux régions, la plupart des types avec des représentations d'astragales se limite à un monnayage d'argent de petite dimension ou de bronze. L'explication de ces deux phénomènes reste incertaine.

À Calcédoine sur le Bosphore, où se trouvait un oracle d'Apollon, un astragale est le type principal sur l'avvers de quelques petites monnaies en bronze du IV^e siècle av. J.-C.

Puisque presque tous les exemples monétaires figurant un astragale, comme type principal ou signe fixe, appartiennent aux régions où l'astragalomancie est attestée dans d'autres sources, l'attention des historiens et archéologues pourrait gagner à se porter sur les cas, beaucoup plus rares, où des astragales se trouvent sur les monnaies de cités comme Antandros du Troade, dont aucune source ne laisse présumer d'un lien avec l'astragalomancie, du moins jusqu'à présent.

MOTS-CLÉS

Antandros,
astragale(s),
astragalomancie,
Calcédoine,
Chypre,
Cilicie,
Claros,
Ionie,
Lycie,
Pamphylie,
Pisidie.

Astragaloi are dice usually made from the knucklebones of sheep or goats and were used in games, as well as in oracular divination by sortition from a pre-existing list of answers. [2] They appear frequently on Greek coins, but in most cases they are control symbols which are subordinate to the main reverse type and serve simply to demarcate an issue within a series from other issues bearing different symbols. Thus, to cite one of many examples, an issue of early hemidrachms of Rhodes has a small *astragalos* accompanying the main reverse type (fig. 1), but half-a-dozen other symbols within the same series appear on other near-contemporary issues - club, grapes, thorny branch(es), helmet, pilos, grasshopper. [3] It seems clear that there is no thematic link among them, and that they may well have been selected more or less at random.

More significant are cases where the *astragalos* is a main type or an unchanging (or dominant) subordinate symbol or adjunct. Here a clear pattern emerges in Asia Minor, for, with few exceptions, all the examples identified cluster in two distinct areas. The first is an arc of territory stretching over Cyprus, Cilicia, Pamphylia, Pisidia and Lycia, where there was a long tradition of oracular activity, including astragalomancy, and close associations with the legendary seers Mopsos, his brother Amphilochos, and Kalchas. The second cluster is formed of mints on or near the central coast of Ionia, whose common denominator is proximity to the oracular site of Klaros, where, as we shall see, forms of divination included astragalomancy.

CYPRUS, CILICIA, PISIDIA, AND LYCIA

Astragaloi occur on several coin issues from Cyprus, where their use in divination is attested epigraphically for Aphrodite's sanctuary at Paphos, [4] and an alphabet oracle was closely connected with the cult of Aphrodite Oreia at Soloi. [5] Aphrodite played an important role in astragalomancy, and the best

throw of *astragaloi* in dice-games was called an Aphrodite. [6] At Paphos, a city particularly sacred to Aphrodite, an *astragalos* appears as a symbol on a series of staters (bull standing l. / eagle flying l.) and fractions of the city from the mid-fifth century (fig. 2); [7] the only other symbol recorded on this series is an ivy-leaf, a symbol of Dionysos, who was also an oracular deity. [8] An *astragalos* recurs as an unchanging symbol above Aphrodite's dove on some fourth century staters of Paphos (fig. 3). [9] An *astragalos* within a dotted border is the reverse type of a series of fifth century staters and fractions with on the obverse a man-headed bull recumbent right with head reverted, which were formerly attributed to Paphos but are now assigned to an uncertain mint elsewhere on Cyprus (fig. 4). [10]

Elsewhere on Cyprus, *astragaloi* are found as unchanging symbols on mid-fifth century staters and tetrobols of Idalion, accompanied by a second symbol of an ivy-leaf or a vine-leaf, both symbols of Dionysos (fig. 5). [11] At Kition an *astragalos* appears under a recumbent lion on the obverse of some fifth century staters. [12]

[1] I am particularly indebted to Philip Kinns for patiently guiding me through the complexities of the late classical and early Hellenistic coinages of western Ionia.

[2] See GRAF 2005, esp. 58-66, and NOLLÉ 2007, esp. ch. 2 and 3.

[3] See ASHTON 2001: 99-100, n. 13-24.

[4] NOLLÉ 2007, 14 with refs in n. 73.

[5] *Ibid.*, 269-276.

[6] GRAF 2005, 63-8; SCHÄDLER 1996.

[7] DESTROOPER 2007, 21-22 and pl. II, 15; MACDONALD 1901, 3.

[8] *Ibid.*, 2; BMC 18-38; LEDERER 1931, 258-9; RE s.v. Losung (EHRENBURG) cols 1459/60; BMC *Lycaonia, Isauria, Cilicia*, p. xlvi-xlvii.

[9] BMC 47.

[10] BMC Paphos 1-3; DESTROOPER-GEORGIADIS 2007, 14-15 with pl. I, 5.

[11] BMC 10-28.

[12] BMC 1.

On the mainland opposite and as far west as Lykia no fewer than 18 lengthy inscriptions recording acts of astragalomancy and dating to the period AD c.120-200, have been found at 18 different sites. [13] For the coinage of the region, we may start with Tarsos in eastern Cilicia where staters of the early fourth century BCE depict on the reverse a female figure throwing *astragaloi* (fig. 6). [14] The figure is usually described simply as a girl, but the prominent flower behind her is an anemone, and she is surely Aphrodite. A similar scene, but without the flower, appears on the reverse of hemiobols of Tarsos of c. 389-370 BCE, with a young male head right on the obverse (fig. 8). [15] An *astragalos* also occurs frequently as a symbol on other late fifth/early fourth century BCE coins of the mint (fig. 9). [16]

Herakles as well as Aphrodite had a part to play in astragalomancy, [17] and an issue of staters of the 380s or 370s at Tarsos depicts a head of Aphrodite left on the obverse and Herakles subduing the Nemean lion on the reverse. [18] A head of Herakles three quarter facing right is the obverse type of another slightly later issue of staters at Tarsos. [19] Although the depictions of Herakles were copied from the coinage of Dionysios I of Syracuse and Heraclea Pontica respectively and may well reflect the arrival of Pharnabazos in Cilicia from north-west Asia Minor [20], the choice of types may also have had some religious significance. Contemporary obols which probably but not certainly belong to the mint depict a head of Herakles three-quarter facing left on the obverse and a head of Aphrodite left on the reverse (fig. 10). [21]

Herakles appears at two other eastern Cilician mints. At Issos in the late fifth/early fourth century his head or full figure appear as obverse or reverse types on

four of the seven issues listed for the period; [22] no 3 depicts full-length figures of Apollo on the obverse and Herakles on the reverse. At Soloi a head of Herakles is the obverse type of staters attributable to Tiribazos. [23] Note that the « osselet (?) » mentioned as a symbol on a late fifth/early fourth century coin of the mint [24] is in fact a head of a satyr. [25]

Still in eastern Cilicia, Mallos was said to have been founded by Mopsos and Amphilochos and had an oracle of the latter. [26] An *astragalos* appears as the reverse type on late fifth/early fourth century BCE obols and *hemitetartemoria* of the mint with the city's characteristic swan on the obverse (figs 11-12). [27] It appears as the reverse type of another anepigraphic fifth/fourth century issue of hemiobols with a turtle on the obverse (fig. 13), which is attributed to Nagidos at *SNG Levante Suppl. 1*, 8; however, *SNG Levante*, 168 from Mallos with types turtle and swan, itself cited as a *comparandum* in *SNG Levante Suppl. 1*, surely makes Mallos a more plausible home for it. Note also that Hermes, Herakles and perhaps Aphrodite are depicted on late fifth/early fourth century silver coins of the mint. [28] Hermes, messenger of the gods, brother of Apollo and patron of travellers and merchants, had a still more central role than Herakles and Aphrodite in astragalomancy. The best throw in astragalomancy was named after him, and it is no coincidence that requests for oracular guidance in the Imperial inscriptions of southern Asia Minor focused heavily on travel and business. [29] Finally, Aphrodite and Herakles appear as obverse types on staters of Mallos struck under Tiribazos; [30] the same types occur on some anepigraphic obols which may belong to this mint, or to Evagoras II of Salamis on Cyprus. [31]

[13] NOLLÉ 2007.

[14] *SNG Levante* 64; CASABONNE 2004, 126, type K1. Note a similar scene of the local nymph Arna throwing *astragaloi* on the reverses of fourth century hemiobols, trihemioobols and bronzes of Kierion in Thessaly (*HGC* 4, 667-670, 679-680, 682), fig. 7. See the brief discussion of astragalomancy in Cilicia in CASABONNE 2004, 130, suggesting that Cilicia played an important role in transmitting the practice of divination from the east to the societies of Asia Minor.

[15] CASABONNE 2004, 126, type K2; GÖKTÜRK 2000, nos 17-18; *SNG Levante* 65.

[16] *SNG France* 2, 214, 222-3, 256 (?), 284-5.

[17] NOLLÉ 2007, 15f. (astragalomancy practised in the sanctuary of Herakles at Bura in Achaia), 148-9. Note also litrai of Gela in Sicily depicting on the obverse a head of Herakles r. with an *astragalos* behind, JENKINS 1970, pl. 31, 541.

[18] CASABONNE 2004, 126, type J1.

[19] *Ibid.*, 194, série 1.

[20] KRAAY 1976, 283.

[21] CASABONNE 2004, 126, type J2-3.

[22] *Ibid.*, 135-6, nos 2, 3, 4, 6.

[23] *Ibid.*, 189, série 2, groupe B.

[24] BABELON 1893, 20 no 150; cf. *BMC* 3 and 10.

[25] *SNG France* 2, 128 (the Babelon coin), *SNG Levante* 40-41.

[26] Strabo, XIV,5,16; Arrian, *Anabasis*, II.5.9 (only Amphilochos mentioned); Pausanias I,34,3; NOLLÉ 2007, 22. For references to Mopsos on 5th century drachms of Aspendos in Pamphylia, see ROBERT 1960 (indirect reference to Aphrodite Kastnietis, though not to astragalomancy); comment by CASABONNE 2004, 118, and *id.*, 2000, 46-7.

[27] *SNG France* 2, 385-6; *SNG Levante*, 165; KLEIN 1999, 666.

[28] CASABONNE 2004, 133, nos 5, 7, 10 and 12.

[29] NOLLÉ 2007, 108-9, 125, 283; GRAF 2005, 73-7.

[30] CASABONNE 2004, 190, groupe D and E.

[31] *Ibid.*, 190 *ad fin.*; GÖKTÜRK 2000, no 52.



Fig. 1. Rhodes. AR hemidrachm, 1.87 g. Gorny & Mosch auction 169 (2008), 674.
 Fig. 2. Cyprus, Paphos. AR, 10.94, 09 h. MACDONALD 1901, 3.
 Fig. 3. Cyprus, Paphos. AR, 10.64 g, 04 h. British Museum BNK, G.707; *BMC* 47.
 Fig. 4. Cyprus, uncertain mint. AR, 10.40 g. Spink auction 2.xii.2013, 78.
 Fig. 5. Cyprus, Idalion. AR, 3.76 g. Numismatica Genevensis auction 7 (2012), 249.
 Fig. 6. Tarsos. AR, 10.49 g. Numismatica Ars Classica auction 74 (2013), 293.
 Fig. 7. Kierion, Thessaly. AR, 1.28 g, 01 h. CNG e-auction 342 (2015), 136.
 Fig. 8. Tarsos. AR, 0.57 g, 08 h, 10 mm. Roma e-auction 22 (2015), 308.
 Fig. 9. Tarsos, Pharnabazos, c.380 BCE. AR, 10.86 g, 02 h. Triton auction XVIII (2015), 695.
 Fig. 10. Probably Tarsos. AR, 0.62 g. Heidelberger Münzhandlung auction 64 (2014), 1240.
 Fig. 11. Mallos. AR, 0.82 g. Triton auction VII (2004), 302; ex *SNG Levante* 165.
 Fig. 12. Mallos. AR, 0.14 g. Baldwin auction 34 (2003), 331.
 Fig. 13. Mallos (?). AR, 0.32 g. CNG auction 88 (2011), 437.

Fig. 14. Kelenderis. AR, 0.44 g, 8 mm. CNG e-auction 174 (2007), 53.
 Fig. 15. Kelenderis. AR tetrobol, 3.61 g. Gorny & Mosch auction 229 (2015), 1391.
 Fig. 16. Nagidos. AR obol, 0.80 g, 10 h. Lanz auction 144 (2008), 269.
 Fig. 17. Nagidos. AR stater, 9.00 g. Hirsch auction 249 (2007), 1524.
 Fig. 18. Uncertain Cilicia. AR, 0.22 g. CNG 66 (2004), auction 636; ex *SNG Levante* 209.
 Fig. 19. Cilicia (Mallos?) or Cyprus. AR, 0.38 g. Baldwin auction 34 (2003), 326.
 Fig. 20. Selge. AR, 1.04 g. Pecunem auction 16 (2014), 607.
 Fig. 21. Selge. AR, 0.44 g. CNG e-auction 174 (2007), 51.
 Fig. 22. Selge. AR, 11.08 g. Leu auction 91 (2004), 178.
 Fig. 23. Phaselis. AR, 1.15 g, 9 mm. CNG auction 85 (2010), 465.
 Fig. 24. Phaselis. AR, 1.05 g. CNG auction 64 (2003), 304.
 Fig. 25. Phaselis. AR, 0.46 g. Baldwin auction 34 (2003), 472.
 Fig. 26. Xanthos. AR, 0.28 g. Peus auction 407 (2012), 808.
 Fig. 27. Xanthos. AR, 0.24 g. Lanz auction 162 (2016), 152.

At Kelenderis further west along the Cilician coast an *astragalos* appears as the reverse type of some late fifth century BCE silver fractions with a *gorgoneion* on the obverse (**fig. 14**), [32] and as one of only three symbols on the reverses of a series of late fifth century staters and third-staters (**fig. 15**). [33] The two other symbols are an ivy-leaf and an ivy-branch, both associated with Dionysos. [34] The reverse type itself is a goat, a creature also associated with Dionysos. [35] Note further a silver fraction of Kelenderis having as types on obverse a horse galloping right, and on reverse the forepart of a goat left, with a caduceus to left, and KE – Λ. [36] The caduceus could well be a reference to Hermes.

At neighbouring Nagidos Aphrodite and Dionysos are the principal types on the late fifth and fourth century coinage. [37] An *astragalos* is the unchanging symbol accompanying a head of Aphrodite on the obverse of some fourth century obols (**fig. 16**); [38] the bearded head on the reverse is almost certainly Dionysos. On fourth century staters of the mint (Aphrodite seated l./Dionysos standing l.) an *astragalos* appears as a symbol on the reverse (**fig. 17**), [39] but only as one among eight or nine apparently unconnected symbols, including, however, a Dionysiac vine-leaf. [40] On staters of the mint struck for Pharnabazos, Aphrodite is depicted enthroned right with a sphinx. [41] A head of Herakles is the obverse type of staters apparently struck under Tiribazos. [42]

Fourth century *tetartemoria* and *hemitetartemoria* of an uncertain Cilician mint have an *astragalos* as the main type on both sides or an *astragalos* on the obverse with a blank reverse (**fig. 18**). [43] Finally, a

hemiobol of the early fourth century with an *astragalos* in a dotted border on the obverse and an *ankh* in an incuse square on the reverse could belong either to Cilicia [44] or to Cyprus (**fig. 19**).

In one tradition Selge in Pisidia was founded by Kalchas, and an inscription attests the presence of an *astragalos* oracle there. [45] *Astragaloi* appear almost invariably as adjuncts to the main reverse types (head of Athena r., head of lion r.) of some third century obols and hemiobols of the mint, although there is no obvious

[32] *BMC* 16; *SNG France* 2, 79; KLEIN 1999, 660.

[33] *SNG France* 2, 44-5, 59.

[34] Respectively, *SNG France* 2, 46, 54-55, 64-65; *ibid.*, 48-50, 53, 61.

[35] LEDERER 1931, 258-9; HILL in *BMC Lycaonia, Isauria, Cilicia*, p. xlvii-xlviii.

[36] IMHOOF-BLUMER 1890, 706 no 556, 0.72 g.

[37] CASABONNE 2004, 112-14.

[38] *SNG France* 2, 6-15; *SNG Levante*, 3.

[39] LEDERER 1931, n. 53; *SNG Levante*, 12 [Lederer 1931-].

[40] LEDERER 1931, 269-72, last column.

[41] CASABONNE 2004, 194, série 5. Nagidos is also credited with early 4th century staters with types Aphrodite enthroned l. between two sphinxes / Athena Parthenos being crowned by Nike (*SNG France* 2, 22), but this is cast in doubt by CASABONNE 2004, 118; Cilician Aphrodisias is a possible alternative.

[42] *Ibid.*, 189, série 2, groupe A.

[43] *SNG Levante*, 209-210; KLEIN 1999, 646.

[44] Perhaps Mallos, note the common use of an *ankh* as a symbol on contemporary staters of that mint, e.g. *BMC* 12-16.

[45] NOLLÉ 2007, 14-15, 217-220.

connection between both types and the *astragalos*; the obverse type is a *gorgoneion* (figs 20-21). [46] An *astragalos* also appears as a symbol on the obverses or reverses of most of the fourth century staters of the mint with types wrestlers/slinger, although it is occasionally replaced or accompanied by a triskeles or other symbols (fig. 22). [47] A rare issue of the wrestlers/slinger staters [48] has in the right field of the reverse an eagle or other raptor sitting on an *astragalos*, prompting Johannes Nollé [49] to suggest that at Selge astragalomancy was combined with ornithomancy; note also the symbol of a bird, probably an eagle, below the *astragalos* symbol on another issue of the same series [50].

It is worth adding that Herakles is the most prominent mythical figure on the coinage of Selge, which also often depicts his club and bow as types or symbols [51].

Further west at Phaselis in eastern Lycia, an *astragalos* is the obverse type of a small series of late fifth/early fourth century obols with an owl standing to front with wings open on the reverse. They are accompanied by a very rare hemiobol issue with an *astragalos* on obverse, and on reverse an owl standing right, head facing, wings closed (figs 23-25). [52] On the obols the *astragalos* is often flanked by two stars, which are very occasionally replaced by a club symbol; sometimes there is no symbol at all (the hemiobol has no symbol). One wonders if the stars reflect a popular false etymology for the word *astragalos*, deriving it from *aster*, star, rather than from its true root in the word for bone. If so, may astromancy too have been practiced at Phaselis? Note that in Pollux [53] alternative forms for *astragalos* and *astragalizein* look still more like words derived from *aster*: *astris*, *astrichos*,

astrizein [54]. At the risk of over-egging the cake, may one propose that the owl also signifies the presence of ornithomancy, as has been suggested above for Selge? As for the club, may it reflect Herakles' role in astragalomancy, as has also been suggested above for Selge?

Lycia had an abundance of other oracles, attested epigraphically and in literature, at Kitanaura, Kyaneai, Limyra, Olympos, Patara, Sidyma, Sura, and Xanthos. Astragalomancy was practiced at Kitanaura, which had an important cult of Hermes, and Olympos had an alphabet oracle. [55] The nature of the oracle at Xanthos is not recorded, but there are some rare and recently identified hemiobols with a lion head right or left on obverse and an *astragalos* with the ethnic of Xanthos in Lycian on the reverse (figs. 26-27). [56] They seem to date to the early-mid fourth century. In the 380s or 370s the dynast Mithrapata, who almost certainly ruled from Xanthos, issued fractional silver with as types an *astragalos* on the obverse and a triskeles on the reverse (fig. 28). An *astragalos* appears as a symbol on the reverses of some of his sixth staters with types lion scalp facing/triskeles (fig. 29). [57] Symbols on his staters and thirds with the same types include a head of Hermes three quarter facing left or right or profile right, with or without a caduceus, and a head of Herakles three quarter facing left with or without a club; also, more rarely, a facing bust of Apollo radiate or unradiate. We have seen above that Herakles and, especially, Hermes had parts to play in astragalomancy. Although a further half-dozen or so unrelated symbols were used on Mithrapata's larger denominations, the heads of Hermes and Herakles are among the most commonly encountered on the surviving coinage. [58]

[46] DE CALLATAÿ and DOYEN 1987; *SNG von Aulock*, 5266-8, 5275-81.

[47] *SNG von Aulock*, 5243-65; *SNG France 3*, 1914-1927.

[48] *SNG Pfälzer Privatsammlungen 5*, 327; *SNG Copenhagen*, 240.

[49] NOLLÉ 2007, 15.

[50] *SNG von Aulock*, 5248-9; *SNG France 3*, 1915.

[51] E.g. *SNG von Aulock*, 5269, 5272-3, 5282-4, 5286-94, 5299, 5302-3.

[52] HEIPP-TAMER 1993, 133, 80. The ethnic Φ-Α which appears on the reverses of some of the obols, and find-spots (e.g. an example in Fethiye [ancient Telmessos] Museum, inv. no 6837) makes their attribution to Phaselis reasonably secure. The only specimen of the hemiobol known to me has no ethnic, but its types, though slightly different from those of the obols, encourage the conclusion that it is the half-denomination of the obols.

[53] Pollux, *Onomasticon*, IX, 99. I owe this reference to Professor André-Louis Rey.

[54] Note also the star and crescent flanking the head of cult-statues on coins of Ephesos, Samos and Hypaipa before which children are throwing astragaloi (see below). Could they too betoken the combined practice of astragalomancy and astromancy?

[55] NOLLÉ 2007, 21-23 and 84-91 (Kitanaura); 239-42, 248-9 (Olympos).

[56] Lion head r.: MÜSELER 2016, 181, VIII 62-65. Lion head l.: LANZ (Munich), Auction 162 (2016), lot 152.

[57] *SNG von Aulock*, 4246.

[58] See, for example, OLCAY and MØRKHOLM 1971, 6-7 nos 92-113. These 22 staters in the Podalia hoard have as symbols head of Hermes + caduceus (7), head of Herakles + club (4), dolphin (6), corn grain (2), head of Athena (1), no symbol (2). For the thirds see, for example, *BMC Lycia* etc, 36, 155-156; BABELON 1910, col. 331, 495-495bis, and (Apollo) col. 330, 494. The head of Hermes recurs as a symbol on the third staters (same types) of Perikle, one of Mithrapata's successors (*SNG von Aulock*, 4256).

KLAROS AND ITS ENVIRONS

An unpublished fragment of an inscription found at Klaros attests that the oracle, like that of Didyma, included astragalomancy among its practices. The *crepis* of the fourth century BCE temple of Apollo was decorated with bronze *astragaloi*, estimated to be 316 in number. In addition to the conventional (and perhaps more respectable) consultation of the prophet in his underground chamber, there is also evidence of orinthomancy. [59] Note that in one tradition Kalchas died of mortification at Klaros after losing to Mopsos in an oracle competition [60].

Astragalomancy is reflected in the coinage of Kolophon, on whose territory Klaros lay. Some *tetartemoria* of the early to mid-fifth century have an *astragalos* in a rectangular incuse on the reverse and a head of Apollo on the obverse (fig. 30). [61] *Tetartemoria* of the late fifth century frequently, but not invariably, have an *astragalos* as a symbol on the reverse; the obverse depicts a head of Apollo (fig. 31). [62] Within the first quarter of the fourth century, bronze *chalkoi* depict a head of Apollo right on the obverse, and a kithara in a linear square on the reverse flanked by two *astragaloi* (fig. 32). [63] They are the most common issue of the series; *chalkoi* with "corn-grain" and "thyrsus" symbols also occur in the same series, but they are much rarer [64]. Contemporary *tetrachalka* with the same types, except that the obverse head faces left, also have the kithara flanked by two *astragaloi*. [65] No later coins of Kolophon depict *astragaloi*.

It is worth adding that Dr Kinns has recently identified as belonging to Notion several early fourth century issues previously assigned to Kolophon. They include a series of *tetrachalka* with head of Apollo right / kithara (no linear square) with Apollo's tripod as an unchanging symbol [66]; they date c. 375-360 BCE, and are accompanied by a *hemichalkon* issue with a tripod as

the reverse type. [67] It has to be admitted, however, that none of the issues now assigned to Notion features *astragaloi*, despite Notion's very close proximity to Klaros.

The principal deity of Teos, some 35 km north-west of Klaros, was Dionysos, who, as we have seen, had a part to play in astragalomancy, and when George Bean first visited the modern town of Sığacık in 1946 he was presented with a quantity of artefacts found on the nearby ancient site which included several *astragaloi*, one of which was loaded with a lump of lead, and another bore the inscription "Herostratos loves B.Z.". [68] The city struck an issue of hemiobols in about 400 BCE with a griffin crouching or seated right on the obverse with pointed wings and left forepaw raised, or with both forepaws raised or with both feet on the ground; the reverse type is an *astragalos*. [69] These silver fractions are sometimes attributed to Assos in the southern Troad, but the attribution to Teos seems secure. The same variations in the obverse types occur on early bronzes with on obverse a griffin right and on reverse a *kantharos* in a linear square or rectangle and the Teian ethnic in various forms: [70] the griffin on most of these bronzes has its left forepaw raised, but variations with both feet on the ground [71] and with both feet raised [72] are attested. Moreover, another rare issue of bronze *chalkoi*, perhaps earlier (five known; 12-14mm, 1.24-1.82g) feature on obverse a griffin seated right with curled wings and left forepaw raised, and as reverse type an *astragalos*; in two cases the *astragalos* is certainly within a linear circle, and one has a possible T under the griffin's belly on the obverse, while the other has a possible TH on the reverse [73]. All these bronzes probably date before 375 BCE. Slightly later bronzes with on obverse a griffin seated right, left forepaw raised, and on reverse a *chelys* in a linear square [74] sometimes have T under the griffin's belly. [75]

[59] MORETTI *et al.* 2014, 8; NOLLÉ 2007, 11-12.

[60] Strabo 14.1.27.

[61] D. KLEIN 1999, 402.

[62] MILNE 1941, 35.

[63] *Ibid.*, 78A/B; KINNS 1980, 560, 9 and 9A-C.

[64] MILNE 1941, 80-82; KINNS 1980, 560, 10-11A. Dr Kinns informs me that these symbols are more likely to be a leaf and a Phrygian cap respectively.

[65] *Ibid.*, 561, 13 = Istanbul Archaeological Museums 6041; since 1980 a further half-dozen specimens have come to light, e.g. Giessener Münzhandlung Auction 52, 1996, lot 296. Dr Kinns emphasises to me that this is the first large bronze denomination struck at Kolophon; there are five later issues of the same denomination with the same kithara in a linear rectangle on the reverse, but now mostly with part or complete magistrate's name, all with

Apollo head r., and none with any symbol at all; see, for example, Hirsch Auction 166, 1990, 357, 358 and 360.

[66] MILNE 1941, 122-4, 126; KINNS 1980, 566, 44-47.

[67] *Ibid.*, 567, 49 = BLOESCH 1997, 3046, more are now known. A summary of Kinns' conclusions is given in ROUSSET 2014, 57-59.

[68] BEAN 1967, 136.

[69] KLEIN 1999, 475; issue not known to P. Kinns in 1980.

[70] KINNS 1980, 504.

[71] BMC 36.

[72] KINNS coll., unpublished.

[73] Jacquier Fixed Price List 32, 2004, 119; issue not known to P. Kinns in 1980.

[74] KINNS 1980, 504.

[75] All Kinns coll.



Fig. 28. Mithrapata. AR, 0.66 g. Gorny & Mosch auction 191 (2010), 1601
 Fig. 29. Mithrapata. AR, 1.27 g. Peus auction 407 (2012), 780
 Fig. 30. Kolophon. AR, 0.30 g. Hauck & Aufhäuser auction 18 (2004), 202 (ex D. KLEIN 1999, 402)
 Fig. 31. Kolophon. AR, 0.25 g. Hirsch auction 275 (2011), 3796
 Fig. 32. Kolophon. AE, 1.43 g. Rauch auction 95 (2014), 122
 Fig. 33. Teos. AR, 0.25 g. Gorny & Mosch auction 212 (2013), 1748
 Fig. 34. Airai. AE, 1.80 g, 11 h. CNG auction 94 (2013), 507
 Fig. 35. Phygela. AE, 0.72 g. Hauck & Aufhäuser auction 21 (2009), 155.
 Fig. 36. Phygela. AE, 1.56 g, 12h. Roma e-auction 21 (2015), 283
 Fig. 37. Ephesos. AE, 1.48 g. Künker auction 133 (2007), 7546.
 Fig. 38. Ephesos. AE, 2.2 g, 14 mm. Pecunem auction 12 (2014), 214.
 Fig. 39. Ephesos, AR drachm, 3.65 g, 01 h. CNG auction 76 (2007), 708.

Fig. 40. Ephesos as Arsinoeia. AE, 4.5 g, 17 mm. Pecunem auction 10 (2013), 217.
 Fig. 41. Ephesos. AE, 5.54 g, 22 mm, 06 h. CNG e-auction 273 (2012), 118.
 Fig. 42. Hypaipa. AE, 2.95 g. Jacquier auction 38 (2013), 207.
 Fig. 43. Carian Aphrodisias. AE, 4.95 g, 20 mm, 01 h. CNG e-auction 356 (2015), 317
 Fig. 44. Antandros. AR, 0.3 g, 6 mm. Pecunem auction 10 (2013), 221 (as Kolophon).
 Fig. 45. Antandros. AR, 0.23 g. Münzen und Medaillen Deutschland auction 36 (2012), 359.
 Fig. 46. Kalchedon. AE, 0.77 g, 11 mm. Ebay 181829376972 (13.viii.2015).
 Fig. 47. Kalchedon. AR, 3.35 g. Sternberg auction 35 (2000), 258.
 Fig. 48. Uncertain, Asia Minor. AR, 0.28 g. Gemini auction X (2013), 114.

An *astragalos* also occurs as a symbol on the obverses of some fifth century silver coins of Teos but only as one among a dozen or so other varied symbols (**fig. 33**). [76] Note in particular *SNG von Aulock*, 2259 in Group LXVIII with *astragalos* symbol and curled wings reminiscent of the wings of the griffin/*astragalos chalkoi* mentioned above.

Some 10 km west of Teos, the small city of Airai struck an isolated single issue of bronze coins c. 375-350 BCE with head of Apollo left on the obverse and an owl standing right on the reverse with the unchanging subtype of an *astragalos* in the lower right field; both depictions are of fine style (**fig. 34**). [77] Dr Kinns informs me that some 15 specimens are now known, struck from at least three or four obverse dies. The style of the head of Apollo, with its two braids, is very distinctive and otherwise unknown in Ionia. Could the owl indicate ornithomancy at Klaros, as it may have done elsewhere?

Further north, Erythrai struck a series of bronzes in the period c. 375-360 BCE with types head of Herakles right on obverse, and club with bow in case on reverse. In the early phase of the long series with these types, of the fourteen officials who signed these coins six added an accompanying symbol; two closely linked officials used an *astragalos* [78]. No later coins of

Erythrai feature *astragaloi*. It is worth recalling that Erythrai had its own Sibyl, Herophile, who appears, for example, on some late Hellenistic bronze coins (c. 40-30 BCE), on bronze coins of the Augustan period, and on third century AD *homonoia* coins of the city [79].

Before we move further south it is worth noting that in this northern part of Ionia an *astragalos* occurs as a symbol (one among several) at Leukai in c. 380-360 with the name Archias [80]. Likewise, in the first quarter of the fourth century an *astragalos* was used as a symbol on the obverses of some tetradrachms and drachms of Chios, the only other symbol used being a dolphin [81].

The silver and bronze coinage of Phygela, about 18 km south of Klaros, occurs only in the period c. 400-350 BCE. [82] The silver coins [83] carry no symbols, but *astragaloi* occur commonly as a symbol below the reverse type of the earliest small bronzes with head of Artemis Mounychia three quarter facing left/bull butting right on groundline (**fig. 35**). Of the selection of this series in *SNG Kayhan*, 543-583, nine specimens carry the *astragalos* symbol (545-53), two a *pecten* (543-4), eight have no symbol (554-61), and on 22 (562-83) the symbol, if any, is off-flan or unidentifiable.

[76] BALCER 1968, Groups IX, XXVIII, XXXIX, LXVIII. The griffin/*astragalos* hemiobols were not known to J. Balcer.

[77] AMANDRY 2000; KINNS 1980, 197 and 382, n. 35.

[78] KINNS 1980, 422-3, 22 (Makareos, as *BMC* 76 but with symbol known to appear only on Vienna GR 35075 and Kinns coll.) and 24 (Pythomnestos, as *BMC* 78, with symbol occurring only on that specimen). *BMC* 78 shares an obverse die with a coin of Makareos in Berlin (Dannenberg), which has no *astragalos*. A later (c.350-

342 BCE) issue signed by Gorgion (KINNS 1980, 427, 42; *BMC* 70-71) has a tripod symbol.

[79] Respectively, IMHOOF-BLUMER 1890, 288 no 63a (date from KINNS 1980, 162, 474-5); *RPC* I, 2504; *BMC* 272-3.

[80] KINNS 2010, 493-4, no 22.

[81] MAVROGORDATO 1915, 380 no. 36; HARDWICK 1991, 257-8.

[82] See *SNG Kayhan*, 541-589 for a rich selection.

[83] *SNG Kayhan*, 541-2.

A stag's head below the bull's belly is also known. [84] An *astragalos* symbol also appears below the reverse type of a probably slightly later bronze issue with head of Artemis profile right/bull butting right; [85] no other symbol is known, but a monogram composed of the letters HR is recorded (fig. 36). [86] The only other issues of the series as a whole, with types head of Artemis three quarter facing left/bull butting left in front of palm tree, are mostly of larger module and are signed with magistrate names Sokrates [87] or Kautrios; [88] they seem to be the latest in the series, and carry no symbols. [89]

To the south-east of Klaros, and closer still, lay Ephesos. Pliny calls it an oracle city, [90] and there is epigraphic evidence for a cult of Apollo Manteios. [91] Many *astragaloi* were found in archaic excavation levels of the Artemision, and seem to have had cultic significance [92]. *Astragaloi* feature as an unchanging subtype on four fourth and early third century coin issues. A rare bronze issue dated c. 375 BCE has on obverse a turreted head of Artemis (?) left with an *astragalos* behind, and on reverse a bee with a magistrate's name above within a border of dots (fig. 37). [93] It was followed by a few bronze issues struck c. 375-360/50 with no *astragalos*. [94] Then a large series of bronze coins dating c. 350-c. 320 depicts on obverse a bee and on reverse a stag kneeling left with an *astragalos* above (fig. 38). These divide into two successive pairs of denominations with uniform types, and involve at least 170 varieties [95]. In the earlier part of this period, c. 350-340 BCE, a rare drachm series depicts an *astragalos* on either side of a bee on the obverse, and the forepart of a kneeling stag right with a palmtree behind on the reverse, signed in the names of seven magistrates

(Fig 39). [96] It is noteworthy that the tetradrachms of Ephesos with the same basic types dating c. 390-c. 325 now attest some 270 names, but none carries an *astragalos* on the obverse; nor does the *astragalos* ever appear on later Ephesian silver coins.

After the conclusion of the bee/stag with *astragalos* bronze series c. 320 BCE, the *astragalos* subtype is replaced by a quiver in the same position on bronzes of three parallel denominations, now with a prominent border of dots on the obverse, in a total of 30 varieties [97]. These were replaced when the city was renamed Arsinoeia (c. 290-281 BCE). [98] In that period the mint issued bronzes, in the same three denominations as those with quiver subtype, with on obverse a veiled head of Arsinoe and on reverse either a kneeling stag with an *astragalos* above (large and small denominations), or a stag forepart with an *astragalos* (middle denomination); all carry a magistrate's name, and occur in about 30 varieties (fig. 40). [99] This is the last occasion on which *astragaloi* appear on Ephesian coins before the Imperial period.

Finally, many Ephesian bronzes of the late second and third centuries AD depict on their reverses two children throwing *astragaloi* in front of the cult statue of Artemis Ephesia (fig. 41). Children were employed to cast the *astragaloi* during consultations, the principle being that children are innocent and would not provoke false divinations by their throws. [100] It seems clear that the Ephesian coins depict the practice of astragalomancy. Note also that the cult statue on the coins is flanked by a star and a crescent – could these also refer to astrology, a possibility suggested above for other mints?

Close to Ephesos and to Klaros, Samos struck similar coins with the two children making their throws in front

[84] Peus Auction 407 (2012, Maag), 574 and Pecunem Auction 37 (2015), 262.

[85] BMC 1-3; SNG von Aulock, 2149.

[86] SNG Copenhagen, 1072.

[87] SNG Kayhan, 585-7.

[88] SNG Copenhagen, 1075: "(F)austo(V)".

[89] For the coinage in general see REGLING 1922, and RAGONE 1996, 200 T8, 236-8, 361-2. For dates, see KINNS 1989, 189. Note that LINDGREN and KOVACS 1985, 528, with Apollo head r/bull butting l., there attributed to Phygela, in fact belongs to Gambrion.

[90] Pliny, *Natural History* 5.115.

[91] NOLLÉ 2007, 13-14, with n. 55.

[92] HOGARTH 1908, 190-1; HALLIDAY 1913, 207; NOLLÉ 2007, 13.

[93] KINNS 2002, 188 with n. 29. Kinns described the obverse head as the city goddess or Kybele, but he tells me that he now prefers to regard it as Artemis (?).

[94] *Ibid.*, 191 n. 30.

[95] *Ibid.*, 191-2 with nn. 32-39. It would appear that initial issues on a "heavy" standard with *chalkoi* at

c.14 mm, 2g (58 names / magistrates) and *tetrachalka* at c.18-20 mm, 6g (31 names, mostly shared with the *chalkoi*) were succeeded by later issues on a reduced standard, with "light" *chalkoi* at c.10 mm, 1 g (51 names) and new *trichalka* at c.16 mm, 3 g (30 names, mostly shared with the "light" *chalkoi*). I thank Philip Kinns and Walter Holt for this updated information.

[96] *Ibid.*, 191, with n. 31 (listing six magistrates; a seventh, Pelagon, has since come to light).

[97] For the three denominations, see KINNS 1999, 94, n. 172; MILNE 1937, 158 no. 13; Waddington 1599. For date and varieties, see KINNS 1999, 93-4 with nn. 171-2.

[98] COHEN 1995, 177-9.

[99] Large: SNG Copenhagen, 258-9 (fig. 40). Middle: Aufhäuser Auction 14, 1998, lot 155. Small: Cabinet des Médailles, Paris, FG 534 (available on the Gallica website).

[100] NOLLÉ 2007, 13 and n. 47. The Ephesian coins were struck under Septimius Severus, Caracalla, Geta, Severus Alexander, Maximinus, Gordian III (fig. 41), Philip I, Philip II, Decius, Valerian I, Gallienus and Valerian II: see KARWIESE 2012, nos 405-6; 463-4, 475; 541, 560-2; 751; 841; 850-1; 946; 961; 980, 1018-19; 1078; 1218.

of the cult-statue of Hera, which is also flanked by a crescent and star, during the reigns of Caracalla [101] and Saloninus. [102] Inland from Klaros, Hypaipa in Lydia also depicted the scene on coins of Geta, [103] Gordian III, [104] Trajan Decius [105] and Gallienus (fig. 42); [106] here the children play in front of the cult statue of Artemis Anaitis, again flanked by a crescent and star. [107]

Hierapolis in south-west Phrygia above the Lykos and Maeander valleys struck coins in the second and third centuries AD with a head of Sarapis on the obverse and two children throwing *astragaloi* on the reverse; no cult statue is depicted [108]. Hierapolis had an alphabet oracle of Apollo Kareios, in operation at roughly the same date as the coins, and struck coins in the second century AD depicting Mopsos, labelled as such and carrying the bow and laurel-branch of the god [109]. The Plutonium, where Sarapis (identified with Pluton at Hierapolis) was worshipped, lay close to the sanctuary of Apollo. The coins with children throwing *astragaloi* thus suggest the possibility of an oracle of Sarapis and the use of sortition by *astragaloi* in the operation of the Apolline alphabet oracle [110].

Finally, south of the Maeander valley Carian Aphrodisias issued bronzes with on obverse a bust of the Boule and on reverse two Erotes seated on the ground playing with *astragaloi* (fig. 43). No cult-statue is represented, but the coins are of exactly the same size as those of Samos and Ephesos from the Severan period depicting children playing with *astragaloi* in front of a cult-statue, and belong to roughly the same period. D. MacDonald suggests that they may “all stem from a single atelier or represent attempts to coordinate types and denominations among several mints”. [111] The cult-statue of Aphrodite on imperial coins of Aphrodisias is frequently flanked by a star and a crescent. [112] It would not be unreasonable

to suggest that astragalomancy and astromancy were practised at her temple.

There remain to discuss only three further instances from, or probably from, Asia Minor. Firstly, Antandros on the south coast of the Troad struck in the period 427-405 BCE some hemiobols with a head of Artemis Astyrene right on the obverse, and an *astragalos* in a square incuse on the reverse [113]. Some carry the legend ANT on the reverse (figs 44-45). [114] There is no doubt about the attribution, for the obverse type, with distinctive crossed bands on the hair, is identical to that of some larger denominations with a goat and the ethnic ANTAN on the reverse; [115] moreover, the Arıcantürk specimen was acquired locally in Burhaniye (anc. Adramyteion). No trace of astragalomancy has been noted in the area, but the Sibyl Gergithia was said to have been born at Marpessos north of the Ida range and her tomb was in the temple of Apollo at Gergis; she apparently delivered her prophecies in Greek hexameters. In the fourth century Gergis minted bronzes with the head or bust of the Sibyl on obverse and a seated sphinx on the reverse. [116] One may add that Apollo's oracular temple at Gryneion in Aiolis was not far by sea from Antandros, although there is no evidence for any close contact between them.

Secondly, Kalchedon on the Bosphorus struck a rare and isolated issue of *chalkoi* around the middle of the fourth century BCE with an *astragalos* as the obverse type and a grain ear on the reverse (fig. 46). [117] In one tradition the city took its name from the son of Kalchas, [118] and an apparently human bearded head on drachms of Kalchedon from the first half of the fourth century BCE has been proposed as that of Kalchas. [119] The reverse type is a four-spoked wheel (fig. 47). Apollo played a central role in the pantheon at Kalchedon where he was worshipped under the oracular epithets Chresterios and Pythaios, and where he

[101] SNG Copenhagen, 1742.

[102] BMC 391. IMHOOF-BLUMER 1911, 5f.

[103] ALTINOLUK 2013, 146, type 130.

[104] *Ibid.*, 152, type 147.

[105] *Ibid.*, 155-6, type 160.

[106] *Ibid.*, 159-160, type 173.

[107] See also ROBERT 1976, 39.

[108] WEBER 1913, 150, issue XXVII/2.

[109] *Ibid.*, 140, issue XX.

[110] NOLLÉ 2007, 14 and reff.; IMHOOF-BLUMER 1911, 6.

[111] MACDONALD 1992, 107 (type 123).

[112] For the cult-statue of Aphrodite flanked by star and crescent, see, for example, *ibid.* (plates), reverse dies 128-9, 131-152, 192, 195, 211, 234, 243, 247, 253-4, 282, 349-50, 375-8, 409, 466, 552-67.

[113] Dates courtesy of Aneurin Ellis-Evans and Jonathan Kagan who are studying this and related coinages.

[114] SNG Turkey 9 (Arıcantürk coll.), 251, 0.31 g.

[115] SNG von Aulock, 1488-92, 7579.

[116] SNG von Aulock, 1513-16. For Gergis, its coins, and Gergithia, see NOLLÉ 1998, 505-507, with reff. Note that the griffin / *astragalos* hemiobols attributed above to Teos are sometimes assigned to Assos in sale catalogues, for Assos too uses a griffin as an obverse type. Assos lies on the south coast of the Troad to the west of Antandros, and if the attribution were sound we could have the beginnings of a third cluster of mints using an *astragalos* as a type. However, the arguments marshalled above make attribution to Teos far more likely.

[117] *Recueil*, 293 n. 18; HGC 7, 547; SNG BM Black Sea, 147.

[118] Hesychius Illustris 21 = FGrH 390 F 1, 21.

[119] HGC 7, 510; SNG BM Black Sea, 84-85.

had an important divination sanctuary. Apart from the coins, the earliest evidence for the existence of the oracle is from the third century BCE. [120] If the bronzes with an *astragalos* refer to the practice of astragalomancy, the date can be raised to the fourth century.

The final case from, or probably from, Asia Minor is a rare issue of fifth century BCE anepigraphic hemiobols of uncertain attribution. It has on the obverse a lion head left and on the reverse an *astragalos* in a deep incuse; on stylistic grounds it looks as if it may belong to Caria or Lycia, but this is far from certain (fig. 48).

CONCLUSION

Firstly, we have seen that the overwhelming majority of cases in Asia Minor of *astragaloi* appearing either as main types or as sole or dominant symbols occur in two regions, the arc from Cilicia to Lycia, including Cyprus, and the area around Klaros, in both of which astragalomancy is known from other evidence to have been widely practised. It seems reasonable to suggest that at other cities where *astragaloi* come to light on the coinage as main types, or as unchanging sub-types, but where other evidence for astragalomancy is lacking,

[120] ROBU 2014, 191, 195-6 esp. n. 61, 199-200; ROBU 2007.

archaeologists and historians could find it profitable to keep an alert eye open for it. Antandros, for example, would be a case in point.

Secondly, there is also a chronological clustering of depictions of *astragaloi* used as main types or as sub-types. With few exceptions, almost all date from the second half of the fifth to the early third century BCE, with a particularly heavy concentration in the first half of the fourth century. After this period *astragaloi* as types or sub-types seem to disappear completely from Greek coins of Asia Minor until the appearance of two children throwing *astragaloi* on various Imperial-period issues of western Asia Minor in the late second and third centuries AD. This applies even to mints like Kolophon and Ephesos, where there is firm independent evidence for the practice of astragalomancy. As we have seen, despite frequent earlier occurrences, *astragaloi* disappear from the coinage of Kolophon in about 375 BCE, never to return. At Ephesos the *astragalos* subtype appears sporadically between c. 375 and the 280s, but *astragaloi* then disappear, reappearing only in the late second and third century AD on the Imperial bronzes depicting children throwing *astragaloi* in front of a cult-statue of Artemis. These chronological concentrations as yet elude explanation.

Finally, it is noteworthy that *astragaloi* appear mainly on bronze coins and silver coins of fractional denomination. They rarely occur on silver coins of drachm size and above. Again, the phenomenon eludes explanation. ■

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ABBREVIATIONS

<i>BMC</i>	<i>British Museum Catalogue</i>
CNG	Classical Numismatic Group Inc., Lancaster, Pa, USA.
<i>HGC 4</i>	HOOVER, Oliver D, 2014, <i>Handbook of Coins of Northern and Central Greece</i> (The Handbook of Greek Coinage Series 4), Lancaster Pa - London.
<i>HGC 7</i>	HOOVER, Oliver D, 2012, <i>Handbook of Coins of Northern and Central Anatolia</i> (The Handbook of Greek Coinage Series 7), Lancaster Pa - London.
<i>Recueil</i>	WADDINGTON, William Henry, BABELON, Ernest, REINACH, Theodore, 1904-1925, <i>Recueil général des monnaies grecques d'Asie Mineure</i> , Paris.
<i>SNG</i>	<i>Sylloge Nummorum Graecorum</i> .
<i>Waddington</i>	BABELON, Ernest, <i>Inventaire de la Collection Waddington</i> , Paris, 1898.