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News

Monograms on staters minted in Aspendos during the IV-III Century BC. Numerical notes linked to the size of the issue

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Abstract: Monograms on Aspendos staters have reputedly been difficult to understand as these were considered signs with Greek forms derived from the Pamphylian dialect. However, if these acronyms are considered as signifiers representing numbers, expressed in Greek with the same letters, rather than acronyms interpreted like monograms made up of letters, these are then unexpectedly read as continuative numbers, marking a gradual advancement in the minting process.

Keywords: Aspendos Coinage, Monograms on Aspendos staters, Monograms on Greek coins, Greek coin size issues.

Aspendos was the oldest city of Pamphylia, a tiny coastal region in Asia Minor, overlooking Cyprus and bordering Lycia in the west and Galatia in the north-east. The Greek name for the region derives from *pan*, meaning all, and *philē*, meaning tribe. This indicates the heterogeneous origin of Greek settlers founders of cities in the region between the VII and VI Century BC. Aspendos was an Argos colony (Strabo XIV; P. Mela, I, 78) inhabited originally by Doric descendants. Side inhabitants on the other hand originated from Cyme, in Aeolis, and were related to Aeolians. Some linguistic evidence also suggests that other settlers came from the northern part of Crete where a Doric dialect was spoken.

Monetary production in Aspendos began in the V Century BC and was prolific. The famous Aspendos stater featuring two wrestlers on the obverse and a slinger on the reverse was widely used in Southern Anatolia and the Eastern Mediterranean[1]. The design was initially executed on an incused square and subsequently within a beaded square. A triskeles is featured on the reverse, on the right of the slinger. On the left there is a vertical representation of the indigenous form of the city's name that was at the basis of the Greek adaptation ΕΣΤϜΕΔΙΙΥΣ, Estwediis.

Two wrestlers represented on the obverse underlines the importance of hand to hand combat in Greek civilization. Wrestling was considered to be an essential form of exercise to strengthen the body and character forming for young men. Wrestlers grappling each other were represented on many vases and bas-reliefs and as statues and forming sculptural groups. Wrestling is mentioned in Homer's works the Iliad and the Odyssey and was part of the Olympic Games. Even Plato has been reported as having wrestled at the Isthmian Games[2]. The kings of Egypt Ptolemy II and Ptolemy III have also been represented in artistic form as victorious wrestlers.

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[1] See KRAAY C. M. (1986), p.103.
[2] POLIAKOFF M. B. (1996), p. 1193.
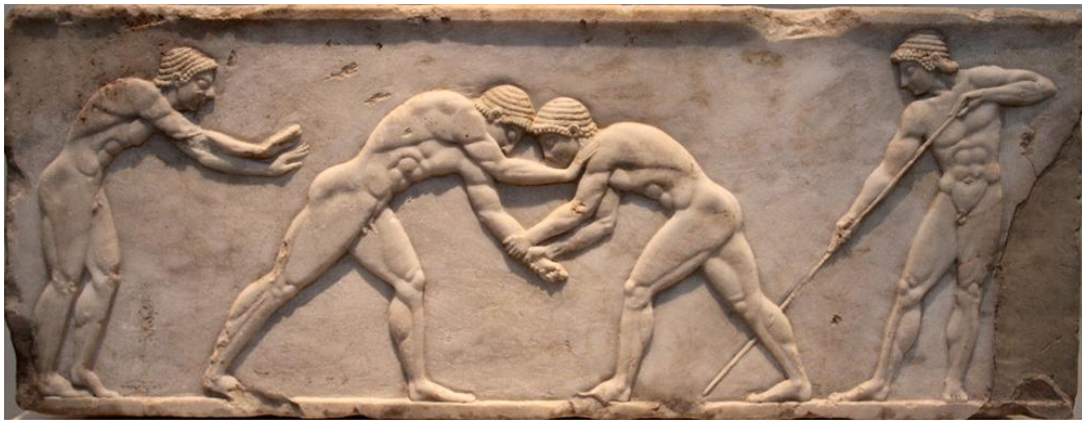
Marble bas-relief (510-500 BC) that represents two fighting wrestlers
(National Archaeological Museum of Athens).

Wrestlers were represented initially in a variety of positions on the reverse of the Aspendos staters, these include facing each other as opponents but not touching each other, also grabbing the opponent's leg or holding the other's arm as the opponent grabs the other's neck and so forth, 16 different positions are known to have been represented[3]. During the IV Century BC the image of the two wrestlers is increasingly defined as adopting a single position and an illusion of three dimensional space is beginning to appear with the use of perspective visible with wrestlers constantly represented on each stater at the start of the match, grabbing the other's arm and facing each other with the positioning of the legs at three quarters of a length apart and leg muscles tensed for balance. On the foreground there is always the wrestler on the left grabbing with his right hand the opponent's left wrist.

During the IV Century BC an upright representation of the opponents separated by two letters or symbols is introduced and becomes the norm with the reverse of the stater, although less systematically, also struck with single letters or monograms. The hypothesis put forward in this article is to defunct the common held belief that such signs are monograms referring to the magistrate's name but rather are numbers that increase in value and are part of each issue thus allowing each minted stater to be counted and accountable, a practice already in use in other Greek mints[4].

The method the Greeks used to write numbers has not been fully discovered. The oldest Greek numeral system[5] was called Attic or even Acrophonic because they used as numerical symbols the initial letters of the words that indicated the main numbers (from *akron* meaning extremity, beginning and from *phōnē* meaning voice). Basic symbols used to arrive at numbers were I = 1, Π = 5, Δ= 10, H = 100, X= 1,000, M = 10,000 and other signs to achieve this were obtained by adding or multiplying two basic symbols. For example, the number 2,000 was expressed as XX; the number 50 was indicated with ⌐ (5 times 10 = 5 x 10), etc. The Ionic or Milesian system is the most recent method known, originating from Miletus thus known as Milesian [6] or even Alphabetic (see the table above). The system used 27 alphabet symbols, nine for numbers lower than ten and nine for multiples of ten lower than 100, and nine for multiples of 100 lower than 1,000. The classic Greek alphabet was composed of 24 letters, three archaic letters fallen into disuse were also used to make up the number of 27 letters. The archaic letters were *digamma*, in the form of Ϝ or in the most common form ⊏ which indicated number 6, *koppa*, Ϙ, used to represent number 90 and *sampi*, ⅄,

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[3] See TEKIN O. (2000), p. 59.

[4] Such reading about the monograms on the coins of various Greek mints has been done by me in DE LUCA F. (2015a), p. 21 ff.; DE LUCA F. (2015b); DE LUCA F. (2016a); DE LUCA F. (2016b); DE LUCA F. (2016c), DE LUCA F. (2017a) and DE LUCA F. (2017b).

[5] On the Greek numeral systems see HEATH T. (1981), p.30-35; GUARDUCCI M. (2005), p. 85-87.

[6] On this argument see GUARDUCCI M. (2005), p. 86.

for the number 900. The Ionic numeration system dates back to the 5th Century BC when these letters were still in use. In this system when lower case letters were used to signify numbers, these were followed by an apex. In order to signify thousands up to 9,000, an upper or lower stroke was struck before the letters, for instance ,A=1,000.

A	α'	1		I	ι'	10		P	ρ'	100
B	β'	2		K	κ'	20		Σ	σ'	200
Γ	γ'	3		Λ	λ'	30		T	τ'	300
Δ	δ'	4		M	μ'	40		Y	υ'	400
E	ε'	5		N	ν'	50		Φ	ϕ'	500
Γ	ς'	6		Ξ	ξ'	60		X	χ'	600
Z	ζ'	7		O	o'	70		Ψ	ψ'	700
H	η'	8		Π	π'	80		Ω	ω'	800
Θ	θ'	9		Ϙ		90		Ͳ	$ϡ'$	900

The Ionic or Alphabetic numerical system

Symbols with numeric value were represented in hundreds, tens and units either decreasing or increasing in value from left to right. For example the number 329 could be written as TKΘ or ΘKT. Numbers could also be rearranged without any particular order and mixed up, for instance 329 could also be TΘK.

It was common also for numbers in everyday language and in numerical notations to be expressed in tens or *dekades*, hundreds or *hekatontades*, thousands or *chiliades*, tens of thousands or *myriades* and hundreds of thousands or *dekakismyriades*. Plato for instance (*Phaedrus*, 257) used the expression "*ennea chiliades etōn*" to signify nine thousands of years, that is to say 9,000 years.

Numerical notations were allocated underlying signifiers depending on the context represented. Underlying signifiers were expressed in tens, hundreds, thousands and so forth. Only a careful analysis of such data can reveal whether the symbol referred to is finite or if it branches out towards other decimal numbers. Moreover the representation of signs on coins relied on the multiplication principle whereby two or more numbers were struck in proximity so as to calculate the product of these numbers. The representation in long form of this calculation would not be feasible on a small coin. This method of abbreviation was useful to indicate a larger number in a practical context.

The Attic or Acrophonic numerical system were a common feature on coins and other contexts and sometimes this was used alongside the Ionic or Alphabetic system[7]. Other symbols in turn deriving from a secondary set were also used to describe quantities of money. These had been based on numerical systems used in specific *poleis* that had also a wider geographical application[8]. For instance, the notation ⊙, sometimes simplified to O, that in Argos indicates the amount of 10

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[7] The ancient sources attest in various cases the contextual use of numbers expressed according to the Attic numeral system and numbers expressed according to the Ionic numeral system. So, for example, in the II-I century BC on two Boeotian epigraphs we can find numbers taken from the Attic numeral system used inside the same figure close to numbers taken from the Ionic numeral system and numbers taken from the Attic numeral system used close to numbers taken from an archaic numeral system: see ROESCH (1966), p.77-82, n.15; CALVET- ROESCH (1966), p.297-332. Furthermore, the two systems are seen side by side in a number of Greek papyrus-rolls found at Herculaneum: these states are on the title page, after the author's name, the number of books according to the Ionic numeral system, and the number of lines according to the numeral system, just like when we commonly use Roman figures to denote *Books* and Arabic figures for *sections* or *lines* (see HEATH T., 1981, p.35).

[8] For epigraphs in which there are numeric symbols from a minor numeral system used far away from their place of origin see ROESCH (1966), p.77-80, and GRANDJEAN (1995), p.1-26.

drachms[9], was used throughout the Greek world, especially in Aspendos, founded by Argos' settlers. When the numerical value from Argos representing O to be 10 drachms is multiplied with Π or 5 according to the Attic system, the symbol ⊡ is obtained which has the value of 50 drachms[10].

Initials featured on Aspendos coins reconsidered in a numerical context also acquire interesting numerical sequences. Such symbols are no longer just a set of letters but rather represent numbers. The initials suggest a graduating sequencing when minted. Sequencing on coinage occurred when flats were stamped with symbols, a widespread variety of coins were struck with these. When dies became damaged or needed to be replaced, the new dies would be engraved with the same numbers and used if a quantity needed to be completed or a greater number if they passed on minting the next quantity of coins.

Examples of coins coins I-III, plate I, have each letter that belongs to the same issue minted from 380-325 BC, these letters have elements that are actual numbers. On the obverse of coin I, plate I, the acronym ΔA was inscribed with the number 10 from the Attic system, Δ, multiplied by the number 1,000 from the Ionic system, ‚A, simply struck as A to simplify the engraver's work. This procedure resulted in the number 10,000 not entirely represented but expressed in hundreds or *hekatontades* of drachms. These were equal in value to 1,000,000 drachms as the number 10,000 on the coin was multiplied by 100, x 100, a decimal order is in place suggestive of the ΔA notation that equals to 1,000,000 drachms.

Coin II, plate I, bears the acronym AA, the number 1,000 from the Ionic system, ‚A=A repeated twice. The aim therefore was to represent 2,000 drachms in the same way as it was represented with the Attic numerical system that recorded twice in a row the number X=1,000. The numerical notation of AA = 2,000 drachms appears on the reverse of coin II, plate I, as an incomplete number as it is represented in a higher order, in thousands or *chiliades* to be exact. The amount is not equivalent to drachms but to 2,000 thousands of drachms which can be written as 2,000(,000) with the thousands in brackets.

The numerical notation on the reverse of coin III, plate I, is made up of two *digamma* side by side, the latter with Ⅎ and the former with the Pamphylian *digamma* Ⱶ, typical of the Greek dialect spoken in Pamphylia[11]. Since both these signs indicate the number 6 it follows that they multiply together attaining the result of 3,6(00,000) drachms, equal to 1,800,000 staters, which is the expected issue limit. The monogram ⱵF, then, is clearly a figure composed by numbers and not

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[9] On this last sign see TOD M.N. (1979), p.5.

[10] On the numerical notation ⊡ see GRANDJEAN (1995), p.1-26, e DE LUCA F. (2017a).

[11] In many dialects the *digamma* disappears before the classical period. In the Ionic dialect, for example, it disappears after the oral composition of Homer's epic poems and before writing their written text (VII century BC). In many cases the ancient presence can be reconstructed, because its fall has had metric consequences: for example the word οῖνος, "wine", was used in the metric succession where we would have expected a word which started with a consonant. Other evidence and philological analysis shows that οῖνος was previously ϝοῖνος *wòinos* (latin *vinum*).

In the Pamphylia's Greek dialect, whose main nucleus was the Doric dialect imported from the motherland Argos to Aspendos, instead , the *digamma* remained longer in use like evidenced by the city's name reported on the coins until the III century BC. In fact, in the Pamphylian Greek there were two signs to indicate the *digamma*: next to the sign F there was even the sign Ⱶ. NICHOLAS N. (2005), p.3-5, citing BRIXHE C. (1976), p.46-57, hypothesizes that in the Pamphylian dialect the sound /w/ was changed in labial dental /v/: in this context it is likely that the letter F was used to express a new sound /v/, while with the special sign Ⱶ it expressed the old sound /w/ in the positions where it was stored.

The Ionic or Alphabetical numeral system is affirmed between the end of the VIII century BC and the beginning of the VII in Miletus (Guarducci M., 2005, p.86) spreading soon throughout Asia Minor, including Pamphylia. In this numeral system the *digamma* indicated the number 6 but soon the form F of the letter was substituted by the form Ⅽ. In Aspendos as the form F remains in use to indicate the letter *digamma*, in the same way it remains to express the number 6, number that on the other hand could also be indicated with the sign Ⱶ of so-called pamphylian *digamma*.

the beginning of a name composed by letters that otherwise would be unpronounceable. Exactly like the previous numerical notation, composed by two equal numbers (that means AA=2,000[,000] drachms), even the numerical notation ᏙF is composed by two equal numbers, two 6 that indicate the amount of 3,6(00,000) drachms.

The completed numerical progression is therefore composed of 1,000,000 then 2,000,000 followed by 3,600,000 drachms, indicating sequenced quantitative stages in the minting process. Since coins in the issue were staters, this meant that each piece had the value of 2 drachms. The three quantitative steps are divided in half by 2 of which 1,000,000 is reached by minting 500,000 staters, followed by 2,000,000 drachmas minting 1,000,000 staters to finally reach the 3,600,000 drachms target once 1,800,000 staters had been minted.

The sequence reported on coins 1-6, plate I, is also of note, the first numerical notation, coin 1 is ΦK in which 500 from the Ionic system, Φ, multiplies with number 20 from the same system, K, with the result of 1,000,0(00) drachms, equal to 500,000 staters, because it is expressed in hundreds or *hekatontades*; on coin no. 2 follows the next notation which is made up by the product of two figures from the Ionic system: 30 (Λ) x 500 (Φ) = 15,000, figure always expressed in hundreds and therefore corresponding to 1,500,0(00) drachms, equal to 750,000 staters. The 2 million drachms tranche is reported with ME, coin no. 3, in which the number 40 from the Ionic system, M, is multiplied with number 5 from that system, E, forming the figure of 200 expressed in an implied manner in tens of thousands or *myriades* and it corresponds to the amount of 2,00(0,000) drachms, equal to 1,000,000 staters. The number M is found even in the numerical notation on the following coin no. 4, but no longer represents the number 40 as in the Ionic numerical system but rather the number 100,000 as in the Attic system. It is multiplied by the number 30, Λ from the Ionic system resulting in an amount expressed in tens, *dekades*, of 3,000,00(0) drachms that are equivalent to 1,500,000 staters. In the notation ΣK of the following coin no. 5 the number 200 from the Ionic system, Σ, multiplies with 20 from the same system, K, with the result of 4,000(,000) drachms. The notation ΠO on coin no. 6 concludes the sequence. This notation corresponds to the number 5 from the Attic system (Π) x Argos' original 10 drachms symbol (O), of which Aspendos was a colony: the result of 50 drachms is expressed in hundreds of thousands and is the final limit of the issue which is of 5,0(00,000) drachms, corresponding to 2,500,000 staters.

The five million drachms numerical threshold is also represented differently on coins from other issues, as in the case of the obverse of coin 1, plate II, where the AΦ sign is present formed by the multiplication of the number 1,000 of the Ionic system (A=,A=1,000) with the number 500, Φ from the Ionic numeral system that has the result of 500,000 tens of drachms, which corresponds to 5,000,00(0) drachms, equal to 2,500,000 staters. On the coin no.2, plate II, next to the number 500, Φ, instead of the number 1,000 of the Ionic system (A=,A=1,000) the 10 drachms original Argos symbol is found, ⊙. The result from the multiplication is the amount of 5,000 drachms evidently expressed in thousands and therefore corresponding to 5,000(,000) drachms. On the coin no.3, plate II, finally, there is a sign that refers to a sum of money in an unequivocal way. The sign Ꝇ, in fact, is the symbol that usually designates the year, as it happens for example on the coins minted in Alessandria, but which was also used to refer to the drachm monetary unit[12]. In the case of the coin no.3, plate II, then, the Ꝇ sign prefixed to the number Φ, 500, expressed in tens of thousands of drachms, designates the amount of 5,00(0,000) *drachms*.

The use of the drachm symbol Ꝇ is not the only sign represented on the Aspendos coins that alerts us that signs composed by numbers and not monograms composed by letters have been engraved. The use of dots **꞉** points to this function. These appear on the reverse of stater from 400-

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[12] On this symbol see KENYON F. G. (1893), Vol. II, p.122; KENYON F. G. (1974), p. 129. See also http://std.dkuug.dk/JTC1/SC2/WG2/docs/n2612/n2612-2.pdf.

380 BC (see coin A, plate II) between BA and FE[13] signs, and are nothing more than a diacritical sign that helped distinguish the numbers from the letters; normally these dots were inserted before and after a number in order to distinguish it from the letters that composed the words of the text in which it was inserted[14]. In the present case the sign **:** is interposed between the numerical notation BA= 2,000(,000) drachms and FE = 3,0(00,000) drachms. Indeed, the figure BA is composed by number 2 from the Ionic system, B, that multiplies with the number 1,000 of the Ionic system (A=,A=1,000) the result is 2,000 thousands of drachms, that means 2,000(,000) drachms, while the numerical notation FE is composed by number 6 from the Ionic or Alphabetical numeral system (F) that multiplies with the number 5 from the same system, E, the result is 30 hundreds of thousands of drachms, that means 3,0(00,000) drachms. The notations affixed on the reverse of the coin A, plate II, therefore, suggest that the coin was minted to reach the edition of BA=2 million drachms, within the FE final size edition = 3 million drachms.

The question arises as to the role these numbers played and why coins from the same issue were numbered in sequence. Progressive numerical notations were reported because it helped to keep count of pieces gradually minted since they made recognizable specific groups of coins that otherwise would be merged into an indistinguishable and single mass. Masters of the coining process were able to divide pieces up according to numerical notation and keep a written record in case mistakes arose. If a mistake occurred when counting the minted pieces it sufficed to recount the coins of one specific group instead of the entire production. This method is commonly used today, for example, when 10,000 Euros need to be counted, these are divided in groups of ten 1,000 Euros, thus facilitating the process if there is a mistake in counting or if one forgets the amount reached in the counting process. With coins some confusion may occur with this process as there are subgroups to the same issue and different issues minted in a similar fashion have been produced.

Thanks to numerical notations on coins officials were able keep a check on the entire amount of rare and precious metals received at the beginning of the process to right through to the end of the line. The division of the same issue into different groups also facilitated control by the authority to which the issue was to be delivered once coined in full.

It is to be noted that acronyms on Aspendos staters make more sense when interpreted as numbers in a sequence rather than as initials of the name of the magistrate responsible for the minting process. This view is compounded by the sheer number of monograms, far too many for each issue and cannot be allocated to different magistrates due to high numbers and longevity of use. Magistrates in the latter case would not have been in service for such long periods as the monograms would have been in use. All becomes clear if acronyms on Aspendos staters are viewed as numbers that follow numerical systems used by Greeks and inhabitants of Asia Minor. Although it is likely that a local dialect was spoken in Aspendos, as suggested by the name of the city engraved on coins, the fact that it was written with Greek letters attests that the Greek language was used to write and count facilitating communication and widespread adoption of the numerical notation system[15]. This view therefore defuncts Babelon's[16] tenet that linked monograms to

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[13] IMHOOF-BLUMER F. (1878), p.141, n.32; p.947-948, interpreted the second part of the legend BA : FE as indicating a personal name and the first part as indicating the title of the most important magistrate of Aspendos, named *Basileus*, but the thesis is contradicted by the fact that from the city's inscriptions we know that the chief magistrate was not *Basileus* but *Demiurgos*. For BRIXHE C. (1976), p. 197, the legend BA : FE would be made up by the initials of an eponymous magistrate title, that could have been BA(ΛΥΣ), and the initials of his personal name, for example FE(ΧΙΔΑΜΥ). But even if this legend was interpreted as proposed by Brixhe how would you explain all the other monograms found on the Aspendos staters?

[14] On the argument see HEATH T. (1981), p. 36.

[15] For MØRKHOLM O. (1991), p.160, "apparently Aspendos was slower than her neighbors, for instance Perge and Selge, in adopting the Hellenistic *koine*" but it is a statement made only on the basis legend's observation on coins minted by the three named cities that, moreover, are all written with Greek letters: too little to even distantly think of excluding that the monograms on the Aspendos coins are thought-out numbers according to the numeral systems widespread all over the Greek world.

magistrates and to obscure meanings derived from compounds from Pamphylian dialect and Greek letters.

The question still arises if the notion can be confirmed that monograms on Aspendos coins are actual numbers and not letters. An analysis of epigraphic sources is undertaken to ascertain this point.

After victories at Marathon and Salamis that forced the Persians out of Greece, Athens formed strong alliances to maintain and increase its fleet requesting yearly contributions to its coffers. A part of the sums paid by the allies (exactly one mina per talent, that means a sixtieth part) was taken for Athena's treasury. Records of the Athenian Tribute Lists were carved on stone and in the years 440-439 Centuries BC, figure B, plate II, third line, it is suggested that Aphytis citizens contributed 50 drachms to the Athena's treasury. This is indicated with the Γ symbol of the Attic or Acrophonic system. The same amount is recorded on a tetradrachm from Amphipolis under Alexander the Great from 318-317 BC. This was represented on the reverse, in the field between Zeus' knee and his right hand (see figure C, plate II). On the Athenian Tribute List no one had a doubt that what came after the word that indicated the Aphytis citizens was a number, because it was something already studied and ascertained, in the Alexander coin case, instead, many people were skeptical about the fact that monogram could actually be the number 50 from the Attic or Acrophonic system just for the fact that it was affirmed now for the first time. A fact, however, remains undeniable: the symbol carried on the Alexander's coin was absolutely identical to the one carried on the Athenian Tribute List of the year 440–439 BC.

The question still arises if numbers that are adjacent are multiplied with each other. The answer can be derived from a wax tablet[17] from VI-VII Centuries BC, transcribed in figure D, plate II, where workings out of a school boy reveal that the simple combination of the number ξ (60) to the number β (2) indicates that they are multiplied between each other giving the $\rho\kappa$ (120) result, reported immediately later; the juxtaposition of the number ξ (60) to the number γ (3) indicates that they multiply together with the $\rho\pi$ (180) result, annotated on the side, and so on.

The same principle is still used today for mathematical calculations, whereby two juxtaposed numbers are multiplied and succinctly representing coins in higher numbers. The highest number that needed to be represented was thus done indirectly and by multiplying the two lower numbers together.

The notion that numbers resulting from these multiplications are amounts expressed in drachms is further confirmed by everyday language use, large numbers were commonly referred to as drachms. This is suggested in *The Knights* (829)*,* by Aristophanes, where the sausage seller reported to have stolen "*treis myriades*", that means thirty thousand (3 x 10,000) drachms. Furthermore the expression "*treis myriades*" implies "*drachmōn*" that means "of drachms". The same is reported in Plutarch's *Marius* (34) where the expression "*myriadōn epta ēmisuos priasthai*", "buy for 7 myriads and a half", that implies "*drachmōn*", "of drachms", is used.

Another perplexing problem is the fact that in the reconstruction of the Aspendos' issues so far shown, and in the reconstruction of the issues that will be shown later, often some numbers were interpreted by the engraver implicitly in hundreds, thousands or other decimals. The question arises as to the legitimacy of this assertion.

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[16] BABELON E. (1901), p.952.
[17] The mentioned wax tablet is the Würzburg inv. K 1014, carried in BRASHEAR W. (1986).

The answer may lie in the referential use of decimal orders for a given number, common practice in the Greek and Roman world. Documentary evidence to support this assertion can be derived from the *Compendio delle antichità romane, ossia leggi, costumi, usanze e cerimonie dei Romani compilato per l'istruzione della gioventù*, Compendium of Roman antiquities, or rather laws, customs, habits and Romans ceremonies written for young people's education. The consulted edition is the one printed in G. Miglio's typography in Novara, Italy, in 1817 where in the introduction the editor wrote that the Compendium was published in France by an anonymous Professor of Literature, and used for a Century by the University of Paris[18]. A citation from 199-200 of this compendium is of relevance, "When you count with an adverb, and the adverb is combined with *sestertium*, it always implies *centena millia*. For example, *semel sestertium* is the same as *semel centena millia sestertium*. And *decies sestertium* means *decies centena millia sestertium*; sometimes we find only the adverb, being omitted or implied the word *sestertium*, or *millia sestertium*. For example, *debet mihi decies*, to say *decies sestertium*, or *decies centena milia sestertium*. *Quadragintorum milia res* implies *sestertium*. *Vespasianus rhetoribus annua centena constituit*, or rather *centena milia sestertium*. To clarify further, when the statement *mille munitium*, *mille talentum* is used, it is a construction of the adjective and of the substantive with the genitive governed by *res*, which was implied"[19].

In Latin, then, exactly as it was in the reconstruction of the numerical sequences on the Aspendos' coins, to understand the order of sizes of which we are talking about, we must contextualize every single number: *decies sestertium* or *decies centena milia sestertium*? Fifty drachms or fifty hundreds of thousands of drachms?

Although no evidence exists that indicates the Greek world used different decimal orders for written digits, some evidence of use can be derived from reconstruction of the numerical sequences reported on the Aspendos coins. Common use in text on papyrus or parchment is found and it would be unimaginable that minters would not use this method to record high value numbers on small coins measuring a mere 23 mm in diameter.

The size of issue still remains to be discussed, the 3,600,000 drachms edition corresponding to 1,800,000 staters, and even more the 5,000,000 drachms edition corresponding to 2,500,000 staters, appear excessive at first glance. To verify whether this interpretation is reliable, an analysis of the whole issue is useful. The issue is identifiable thanks to the club symbol, stamped on the reverse, under the triskeles, dated between 330 and 250 BC, see plates III-VII. The presence of an identifiable symbol makes the selection process to reconstruct the whole issue easier. It becomes easier to pick out which coins are part of the issue, to reframe the coinage sequences and check correspondences between numbers and acronyms.

The issue identifiable by the club symbol, plates III-VII, belongs to the last period of activity at the Aspendos mint (330-250 BC) and it is characterized by a basic artistic level of figures of wrestlers and the slinger. On the reverse inside of the beaded square where the slinger was illustrated is now changed to a circle. On some coins from this issue in the legend EΣTFEΔIIYΣ the lunate *sigma*, C, is found and in some other cases the double I after the letter Δ is not found.

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[18] This Compendium of Roman antiquities can be consulted in its entirety online here: https://books.google.it/books?id=bdGLDI0M0ukC&printsec=frontcover&hl=it&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false.

[19] The Italian text is: "Quando si conta con un avverbio, e l'avverbio è unito a *sestertium*, si sottintende sempre *centena millia*. Per esempio, *semel sestertium* è lo stesso che *semel centena millia sestertium*. E *decies sestertium* vuol dire *decies centena millia sestertium*; qualche volta trovasi l'avverbio solo, essendo omessa, o sottintesa la parola *sestertium*, o *millia sestertium*. Per esempio, *debet mihi decies*, per dire *decies sestertium*, o *decies centena milia sestertium*. *Quadragintorum milia res* si sottintende *sestertium*. *Vespasianus rhetoribus annua centena constituit*, cioè *centena milia sestertium*. Come quando dicesi *mille munitium*, *mille talentum*, è una costruzione dell'aggettivo e del sostantivo col genitivo retto da *res*, ch'è sottinteso".

The numerical notations reported on the pieces belonging to this issue are essential: on the obverse instead of the notation ПO = 5,0(00,000) drachms edition that is found on previous issues from similar size, we find the simple number E, 5 from the Ionic numeral system that indicates the number of millions drachms which composes the series. On the reverse of the coins that goes from O1-R1 to O12-R17, coins no.1-17, plates III-IV, then appears an additional numerical notation: this is the amount of 10 drachms from Argos' numeral system indicated with the ⊙ sign on the coin no.8 and no. 10, plate III, with the simplified sign O on all the other coins. This additional sign gives us information that the coins which carried it were coined to reach the first million drachms, as part of an issue from the E =5 million drachms overall edition. So, 10 stands for 1,0(00,000) drachms, quantitative threshold which will be matched with the first 500,000 staters minted. After minting the first million drachms, that is, the first 500,000 staters, numerical notations begin to be updated. On the three new obverse dies, O14, O15 and O16, the E made to carry the coinage series minting[20] was no longer engraved but there was the ⊏ sign, see figure A, plate VII, formed by an overturned *digamma* which is the symbol used in inscriptions and in Greek papyri to indicate the metretes[21], also known as "Greek amphora", the capacity measuring unit for liquids that corresponds to 144 kotyles[22]. The absolute kotyle value changed from one location to another from 0.21 to 0.33 litres: in the Solon's Attic system, for example, a kotyle was equal to 0.27 litres so a metretes, made up of 144 kotyles, was equal to 38.88 litres.

The symbol ⊏, far from being incomprehensible, arise from the merger of the Pamphylian and Greek letters, an excellent device to suggest the following target to which the mint's activity tends now. In fact, engraving the metretes symbol meant to indicate the figure 144 that corresponded to the number of kotyles that composed a metretes: since a million drachms had already been minted before, equal to 500,000 staters, 144 was clearly a figure expressed in tens of thousands and therefore indicated the following amount of 1,44(0,000) drachms, equal to 720,000 staters, later than the previous amount of 1,000,000 drachms. If, therefore, previously a million drachms were minted, amount reported on the coins with the O or ⊙ notation, corresponding to 500,000 staters, to reach the new 1,44(0,000) drachms aim it will be necessary to mint other additional 440,000 drachms which basically meant to mint other 220,000 staters. That ⊏ is only a "transition" notation is confirmed by the fact that it is reported on only 3 obverse dies which match to 6 reverse dies, coins from no.19 to no.24, plate IV, against the previous 12 obverse dies and the 17 reverse dies, coins from no.1 to no.17, plates III-IV, used to mint a million drachms, that means 500,000 staters.

The numerical notation still following is K, that meant the number 20 from the Ionic numeral system expressed in hundreds of thousands and therefore corresponding to 2,0(00,000) drachms, equal to 1,000,000 staters: it is found on four obverse dies, O17, O18, O19 and O20, plates IV-V, while on the obverse die O21, coins no.33 and 34, plate V, used in the vicinity of the actual threshold achievement of 2 million drachms, equal to a million staters, the number K multiplied with Argos' original 10 drachms symbol, O, with the 2,00(0,000) drachms result. On the coins no.35 (O22-R35) and no.36 (O22-R36), instead, the notation K is transferred on the reverse to temporarily leave on the obverse space for the notation ПO = 5,0(00,000) drachms that is found on the previous issues and that forms an alternative figure to E = 5(,000,000) drachms reported on the obverse of the first coins of the issue under examination.

It can be deduced, therefore, that the obverse and reverse dies used to mint the first million drachms, that meant the first 500,000 staters, were more or less the same number of those used to mint the second million drachms, that meant the second group of 500,000 drachms; precisely 13

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[20] On the reverse of the coin, instead, there are not any signs.
[21] On this symbol see KENYON F. G. (1893), Vol. I, p.153; KENYON F. G. (1974), p. 129. See also http://std.dkuug.dk/JTC1/SC2/WG2/docs/n2612/n2612-2.pdf.
[22] On the metretes and on the **kotyle** see HULTSCH (1882), p. 99-109; RICHARDSON (2004); CARDARELLI (2012), p. 70.

obverse dies and 18 reverse dies for the first million drachms (coins from no.1 to no.18, plates III-IV), 9 obverse dies and 18 reverse dies (coins from no. 19 to no.36, plates IV-V) for the second million drachms. We must also remember that the separation between the different amounts were never clear because the obverse dies and the reverse dies bearing a figure corresponding to a certain numerical issue threshold were used until they broke even if it happened after they reached the threshold indicated. This is maybe the reason why few obverse dies are found working to produce the third group of 500,000 staters, corresponding to the third million drachms[23]: in addition to the obverse die O29 (coin no. 43, plate V) that has the figure AΛ, which is the number 1,000 of the Ionic system (A=,A=1,000) multiplied by 30 from the Ionic system, Λ, with the result of 3,000,0(00) drachms, we have the obverse dies O27 (coin no. 41, pl.V) and O28 (coin no. 42, pl.V) on which is reported the ╠ monogram that is dissolved (see figure B, plate VII) in the product of three figures taken from the Ionic system: I (10) x P (100) x Γ (3) = 3,000(,000) drachms. On the obverse dies O25 (coin no.39, plate V) and O26, (coin no.40, plate V), both used before the obverse dies O27 and O28 bearing the notation ╠ = 3 million drachms, is reported the figure KE that corresponds to the number 25 according to the Ionic system and indicates the previous intermediate figure of 2,5(00,000) drachms; the obverse die O25 matches to the reverse die R39, that still remained in good conditions after being used for the first million drachms production, as demonstrated by the fact that bears the figure O = 1,0[00,000] drachms.

Minting issues continue and at times affect the production of the fourth million drachms corresponding to the fourth group of 500,000 staters: the new target is indicated on the obverse die O30, coin no. 44, plate V, with the numerical notation MO, formed by the product of the number 40 from the Alphabetical or Ionic numeral system (M) x Argos' original 10 drachms symbol (O) = 4,00(0,000) drachms. On the obverse dies O31, O32 and O33 (coins from no. 45 to no.51, plates V-VI), instead, they choose not to bring the full amount of 4 million drachms but the 4.200.000 drachms amount: the ⅄ monogram engraved on these two obverse dies, in fact, is nothing else than the number YK = 420 from the Ionic system expressed in tens of thousands and therefore should be understood as indicating the 4,20(0,000) drachms amount (see figure B, plate VII). On the obverse dies made to mint the last million drachms, the fifth, and probably even the remaining part of the coins needed to reach the previous quantitative limit of the 4 million drachms, they reused the number E = 5(,000,000) drachms that appeared on the first issued coins (obverse dies O34, O35, O36, O37 and O38). On the last five obverse dies (O39, O40, O41, O42 and O43) the number E (5) multiplies by I (10) with the result of 50 that evidently stands for 5,0(00,000) drachms.

The proposed reconstruction, then, shows 43 obverse dies and 68 reverse dies at work to produce 2,500,000 staters, equal to 5 million drachms, the numerical threshold repeatedly and variously indicated on the coins. Dividing the number of staters minted, 2,500,000, by the number of obverse and reverse dies used we obtain the average number of coins produced by each of them which is 58,140 pieces for each obverse die and 36,764 pieces for each reverse die.

As it evidently appears, the monograms reported on the staters belonging to the issue with the club symbol, and on all the other Aspendos coin issues, are numbers and nothing else. Even the supporters of the thesis according to which the monograms refer to the monetary magistrates are aware of the difficulties of such a position. For example, Oğuz Tekin observing that the letters ΠO are found on different staters issues minted over more than a century, throughout all the IV century BC until the beginning of the III, states that "if the letters ΠO indicate the name(s) of magistrate(s), it is difficult to conceive how such a person would have remained in office for so long"[24]. Tekin adds: "even if we regard this change on the reverse as a reform carried out in a short period of time, it would be indeed quite difficult to explain the ΠO on the bronze emissions which were clearly in

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[23] Another reason can be the incompleteness of the issue's reconstruction proposed here.
[24] TEKIN O. (2000), p.166.

circulation at a much later date than this series [of staters]"[25]. But even this interpretative difficulty vanishes when we consider the ΠΟ monogram reported on Aspendos' bronze coins like a number[26]. Even bronze coins edition issues (coins 1-4, plate VIII), were predetermined and annotated on the coins, expressed in drachms: evidently not predetermined in ΠΟ = 5,0(00,000) drachms as in the staters case because it would be translate into an excessive number of bronze coins, but maybe in $\boxed{O}$ = ΠΟ = 50(,000) drachms: in the case of an obol issue a ΠΟ = 50(,000) drachms edition indicates an issue of 50,000 (issue edition expressed in drachms) x 6 (numbers of obols present in every drachm) = 300,000 obols. This kind of edition seems to have had the issue to which the coins no.1-2, plate VIII belong: on the reverse of the coin no.1, plate VIII, is reported the mid issue edition through the multiplication between the number 6 from the Ionic system (Ϝ) with the number 4 from the same numeral system (Δ) the result is 24(,000) drachms in bronze coins; on the reverse of the coin no.2, plate VIII, belonging to the same issue like the previous coin, instead, is reported the final issue edition which is represented by Ionic 1,000 (A=,A) x the number 50 ($\boxed{O}$) with a round result of 50,000 drachms in bronze coins.

Then it should not look surprising the choice to carry on some coins belonging to the issues just examined the metretes symbol, a symbol which indicates a capacity measuring unit for liquids, that refers to a quantity of coins issued, in particular 1,440,000 drachms amount, because something like this already happened in Massalia, city founded by Phokaian settlers coming from Asia Minor. On the obverse of the coin I, plate VIII, a "light" drachm minted in Massalia belonging to a 200,000 drachms edition issue, carries, on the bottom right field, the $\overline{\wedge}$ sign that is a symbol, widely attested in ancient papyri[27] (see fig. A, plate VIII), of the talent's monetary unit, corresponding to 6,000 drachms. Practically, rather than indicating in figures the first group of 6,000 drachms to mint in this issue, it is preferred to introduce the astute variation to indicate the talent's symbol, which corresponds to 6,000 drachms. To be sure that the talent symbol is correctly interpreted on the reverse of the coin I, plate VIII, it is shown the expression ΤΑΛ that, for once, is not a number but the initial part of the word ΤΑΛΑΝΤΟΝ, "talent", that is an alternative way to reaffirm the amount of 6,000 drachms which the mint was working on at the moment. The numerical progression continues on the following coin (coin II, plate VIII) that carries on its reverse numbers expressed in thousands, hundreds and tens which do not follow a decreasing or increasing order from left to right but are expressed in a mixed manner: it is the number 1,305 expressed with the number 1,000 of the Ionic system (A=,A=1,000), 5 from the Ionic system (E) and 300 from the Ionic system, T; since it is a number expressed in hundreds it has to be understood as 130,5(00).

It was said that in Aspendos, like in many other Greek coinages, the numerical notations engraved on the obverse and reverse dies had the main function to help distinguish the coin masses obtained from those dies in order to count them easier. In the issue characterized by the forepart of horse symbol that exceptionally replaces the triskeles, coins 1-13, plates IX-X, the Aspendos minters adopt a different solution to resolve the problem of distinguishing different coin groups falling in the series. This issue is probably a little earlier than the one with the club symbol and like this last one has a 5 million drachms edition indicated on the obverse through the ΠΟ = 5,0(00,000) drachms notation. After the first reverse die that does not bring any indication, coin no.1, plate IX, on the following reverse die, coin no.2, plate IX, the ᛗE monogram carried is composed by the numbers M = 40 Ionic, Π = 5 Attic, I = 10 Ionic and E=5 Ionic that consecutively multiplies to obtain the number 10,000 expressed in hundreds and therefore to be understood as indicating the 1,000,0(00) drachms amount. On the following reverse die, coin no.3, plate IX, appears the new

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[25] TEKIN O. (2000), *Ibidem*.

[26] If the acronym ΠΟ are reported on the Aspendos bronze coins it may not indicate the stater's monetary unit as hypothesized IMHOOF-BLUMER F. (1902), p. 316.

[27] On the talent's symbol written on some Egyptian papyri of the I century B.C. see BAGNALL R.S., BOGAERT R. (1975), p. 84-88; BILABEL F. (1923) 2307. It is possible to consult online many sites like, for example, https://stephanus.tlg.uci.edu/encoding/unicode.proposals/final/numerals.pdf.

✧⧋ monogram where the numbers Π = 5 Attic, Λ = 30 Ionic and H = 100 Attic are intertwined, the result is 1,500,0(00) drachms[28]. The "counter" makes a new sprint forwards, towards the 2 million drachms threshold, equal to a million staters, carried on new reverse die, coin.n.4, plate IX, with the K figure from the Ionic system that stands for 2,0(00,000) drachms or, alternatively, coin no.5, plate IX, with the Ͱ numerical notation where the number 20 (K) intertwines with the number 1,000 of the Ionic system (A=,A=1,000), disposed horizontally, to indicate that these two figures multiply together to get the 2,000,0(00) drachms result. The three million drachms threshold is indicated on the coin no.6, plate IX, bonding to the numerical notation of the coin no.3, plate IX, that signaled the amount of 1,5 million drachms, a number 2 (B) which, multiplied by the result of the multiplication between the numbers already present, gives the result, exactly, of 3,000,000 drachms.

But at this point they choose not to distinguish the various groups of coins through the numerical notations but through a symbol that was added on the reverse below the forepart of horse that distinguishes the whole issue. Here then the eagle, the star, the caduceus, the spear-head, the laurel wreath, the Phrygian helmet and the lyre follow one another in sequence. Each symbol is carried on many reverse dies (see coins R1-R5, plate X) probably until they reached a predetermined number of staters minted that could have been about 150,000: if, in fact, 150,000 staters multiplied by 7, many are the "accessory" symbols that appear below the permanent forepart of the horse, a million staters result is obtained, exactly 1,050,000, equal to 2 million drachms that, added to 3 million drachms already issued earlier, corresponding to 1,500,000 staters, allow to reach the announced 5 million drachms final edition.

A technique still different to distinguish the various groups of coins minted is adopted later, in the period between the 221/20 and the 189/88 BC[29] in which in Aspendos were coined many series of tetradrachms in the name and types of Alexander the Great[30]. The different groups of coins sequentially minted are numbered consecutively in a sequence that goes from 1 to 31. A part of this numerical sequence is proposed in plate X, coins I-IV, where it is observed the presence of the number 16, coin III, plate X, in which figures the *digamma* Ϛ that certainly is a number, shows that they are really numbers in succession. The way with which the different groups of coins are numbered suggests that they were all made up with the same amount of coins.

Once finished the sequence, partially reconstructed in plate X, coins I-IV, the minting of a new group of coins minted in sequence began and they were distinguished by a new numerical progression that restarted from the number A = 1, coin no.1, pl. XI. To discern this new numbering from the previous one, on the new group of coins the numbers that identified them are no longer carried in the left field but under Zeus' throne.

A further set of groups of coins minted in sequence were distinguished, as well as the new numerical progression, by affixing a different symbol for every group, coins I-IV, plate XI. Even in this new sequence the presence of the number 26, coin II, plate XI, in which figures the *digamma* in the Ϛ form, that could only be a number, confirms that these are numbers.

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[28] In the monogram ✧⧋ TEKIN O. (2000), p.167, in place of H see ⊡.

[29] This dating has been convincingly suggested by H. Seyrig based on archaeological findings and general historical considerations (see on the argument MØRKHOLM O., 1991, p.143).

[30] Between the III and the II century BC there was in the Pamphylian area an intense coinage of tetradrachms in the name and types of Alexander the Great: as well as in Aspendos they were also minted in Sillyum, Phaselis and Perge. For MØRKHOLM O. (1991), p.23 and 143, a monetary production so dense is in no way justified by the economic importance of the cities issuers but it was made for the purpose of profit: these tetradrachms were exported to other districts in Asia Minor and especially in the Seleucid Empire where they were often checked, see for example the coin I, plate X, and coin I, plate XI. Archaeological finds confirm a strong presence of tetradrachms in the name and types of Alexander the Great in Syria coming from Pamphylia starting from the first 40 years of the second century BC.

The presence of three different numberings that always start from A=1 with the addition of useful elements to distinguish each series from each other, changing the numerical notation position, or adding a symbol, clearly excludes that the numbers on these different tetradrachms groups are dates, as it was commonly believed[31], but it clarifies their nature of identification elements that distinguish batches of minted coins in succession according to a fairly widespread use in the Greek world: they are distinguished with a progressive numbering, even if it is alphabetical and non-numerical, some silver drachms minted in Velia (Lucania) in the 440-400 BC, a series of staters minted in Poseidonia (Lucania) in the 420-410 BC, the silver decadrachms minted by Ptolemy II Philadelphus between the 270 and the 260 BC, the gold octodrachms minted by the same king between the 261 and the 241 BC[32] and some drachms minted in Massalia (Gaul) in the 200-150 BC[33].

If, as seen, the initials carried on the Aspendos staters are made up of numbers and not by letters it is time to look with a different eye at a legend brought in exergue on the obverse of some staters minted in the 400-380 BC, not marked by any symbols and bearing the numerical notation ϜႱ = 3,600,000 drachms. According to the common opinion the legend would be ΕΛΥΨΑΜΕΝΕΤΥΣ on the coins that come from a first obverse die, coin I, plate XII, or, on the coins coming from a second obverse die, ΜΕΝΕΤΥΣΕΛΥΨΑ, coin II, plate XII[34]. Frohener's interpretation on such legend is the most affirmed according to which it is the engraver's signature to dissolve in Ε(Γ)ΛΥΨΑ ΜΕΝΕΤΥΣ: "I, Menetus, engraved". In this sentence, then, ΜΕΝΕΤΥΣ would be the Pamphylian dialect form of the name ΜΕΝΕΤΟΣ[35].

But this thesis presents many weaknesses that undermine its credibility. First of all, this would be the only case of signature in the Aspendos coinage and it already seems strange. Then, it is not understood why this signature would have been put to staters in a strictly conforming style to that of so many other staters of the same period. To confirm the theory that it is the engraver's signature de Callataÿ[36] makes us notice that even other staters minted in the not far Soloi, *polis* of the Cilicia, are signed by an engraver named Apatorios with the words ΑΠΑΤΟΡΙΟΣ ΕΓΛΥΨΕΝ, "Apatorios engraved". The fact that in this last legend the same verb from Aspendos' legend was used would erase any doubt about that being a signature as well.

However the signature of the engraver Apatorios presents problems not for the verb used, but for the person. In fact, even if we want to take for granted that ΕΛΥΨΑ is really separated from ΜΕΝΕΤΥΣ and that the first is a verb and the second is a name; even if we want to overlook the artifice of the introduction of the Γ after the first verb's letter so to obtain Ε(Γ)ΛΥΨΑ, that means the first singular person from the aorist of the same verb ΓΛΥΦΕΙΝ, "to engrave", that is found used by the engraver Apatorios to affix his signature on the Soloi staters, the only difference would remain the person: the verb ΓΛΥΦΕΙΝ, would have been used, as usual, in the first singular person

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[31] Believes that, for example, MØRKHOLM O. (1991), p.143. In the case the numbers on the tetradrachms in the name and types of Alexander the Great minted in Aspendos are considered dates, it is necessary to determine if even the numbers carried on the tetradrachms in the name and types of Alexander the Great minted in Phaselis and Perge are dates referred to two separated eras or to one provincial Pamphylian era.

[32] For TROXELL H.A (1983), p. 35-41, that refutes to see any dates in the sequence of letters reported on the Ptolemy II Philadelphus coins, the groups of coins to which such letters refer are the different issues minted in succession.

[33] On all the alphabetical numbering cases of coin groups minted in succession named in the text see DE LUCA F. (2015b), DE LUCA F. (2016b) and DE LUCA F. (2017b), p. 1-5.

[34] On this legend see MASSON O. (1976); MASSON O. (1992); MASSON O. (2000), p. 86; BRIXHE C. (1976), p. 197, pl. v, 7-8; LESCHHORN W., FRANKE P.R. (2002), p. 114; DE CALLATAŸ F. (2012), p. 247.

[35] For alternative interpretations, nowadays rejected by many scholars, see ARSLAN M., LIGHTFOOT C (1999), p. 32, and TEKIN O. (2000), p.165.

[36] CALLATAŸ F. (2016), p.72. The same engraver Apatorios signs another obverse dies of Soloi, in Cilicia, engraving his name in the nominative, as well as some Issus staters, always in Cilicia, engraving on the obverse, in the left field, his name in the genitive case.

from the aorist on the Aspendos staters and in the third singular person from the aorist on the Soloi staters. In fact, when the signatures affixed by the engravers and the Greek artists were formed not only by a name in the nominative or genitive case but by formulas made up from a name accompanied by a verb, the verb in the third singular person is always used: so Dioskourides of Samos, mosaic artist who lived in the late Diadochean period, also active in Pompeii, signs his mosaics with the sentence ΔΙΟΣΚΟΥΡΙΔΗΣ ΣΑΜΙΟΣ ΕΠΟΙΗΣΕ, "Dioskourides of Samos made" with the verb in the third singular person[37]; Assteas, a famous pottery painter from Poseidonia (Lucania) who lived in the fourth century BC, signs six vases with the formula ΑΣΣΤΕΑΣ ΕΓΡΑΦΕ, "Assteas painted"[38]. Sometimes the artist does that the same object by himself created to say the name of his maker: for example, Exekias, an Attic potter and pottery painter active in the second half of the sixth century BC, signs his creations with the formula ΕΧΣΗΚΙΑΣ Μ'ΕΠΟΙΗΣΕ, "Exekias made me", that contains the verb always in the third singular person[39].

But the difficulty which puts the theory of the presumed engraver Menetos completely offside is the fact that, if you look carefully, the first legend's sign is not an E but a Ⅼ (see the enlargements in plate XII) that means the drachm's symbol we previously found on the Aspendos coins (coin no.3, plate II). The drachm's symbol occurrence, then, indicates that we are not in the presence of a signature but of a figure expressed in drachms or, better, of a legend that includes *even* a figure expressed in drachms. The legend, then, is not ΕΛΥΨΑΜΕΝΕΤΥΣ but ⅬΛΥΨΑΜΕΝΕΤΥΣ and appears made up by the beginning of three words and by a figure. More precisely the figure expressed in drachms, Ⅼ, is ΨΑ, that means the number 700 from the Ionic system, Ψ, for the number 1,000 of the Ionic system, Α=,Α=1,000, equal to 700,000 drachms. The first abbreviated word is ΛΥ(ΤΕΑΙ), verbal adjective in the feminine plural of the verb ΛΥΩ, "to dissolve", "to finish", "to end"; the verbal adjective is in the feminine plural because it is matched with Ⅼ= ΔΡΑΧΜΑΙ and has the meaning of necessity, it corresponds to the Latin participial *solvendae*. The second abbreviated word is ΜΕΝΕΤ(ΑΙ) that is the feminine plural of the verbal adjective from the verb ΜΕΝΩ, "to remain", with the past passive participle meaning ("remained") and the third element is the beginning of the superlative of ΥΣΤΕΡΟΣ, "rear", in the feminine plural case ΥΣ(ΤΑΤΑΙ), "last", always referred, like the verbal adjective "remained", to ΔΡΑΧΜΑΙ. The legend, therefore, is dissolved in the following way:

Ⅼ ΛΥ(ΤΕΑΙ) ΨΑ ΜΕΝΕΤ(ΑΙ) ΥΣ(ΤΑΤΑΙ)

"700,000 drachms left to finish (= to mint) for last" .

In the legend's alternative version it becomes ΜΕΝΕΤ(ΑΙ) ΥΣ(ΤΑΤΑΙ) Ⅼ ΛΥ(ΤΕΑΙ) ΨΑ that sounds even better: "left to finish (= to mint) for the last 700,000 drachms".
But why would this strange legend ever be reported?

The explanation can only be one. This legend is reported on only two obverse dies bearing the Ϝ Ⅿ monogram that, like seen previously, represents the numerical notation that indicates the 3,6 million drachms threshold, equal to 1,800,000 staters. It is possible that these two obverse dies belong to a 3,600,000 drachms issue, equal to 1,8 millions staters, where normally the first million drachms (that means the first 500,000 staters) were marked with the notation ΕΣ = 5 (Ε) x 200 (Σ) = 1.000(,000) drachms (coin no.1, plate XII), the second million drachms, that means the following

[37] On Dioskourides of Samos figure and works see RUESCH A. (1908), no. 167 and 169; PFUHL E. (1923), p. 849 ff.; COMOTTI G. (1975).

[38] On the famous pottery painter Assteas read TRENDALL A. D. (1936), p.20 ff.; MARZULLO A. (1935), p.12 ff.; TRENDALL A.D. (1952), p.5-26; TRENDALL A.D. (1953), p.25 ff.

[39] On Exekias see PARIBENI E. (1960); HOMANN-WEDEKING E. (1967), p.166-167; *BECATTI G. (1986), p.130; BEAZLEY* J., VON BOTHMER D., MOORE M.B. (1986), p.58-62.

500,000 staters, with KI = 20 (K) x 10 (I) = 2,00(0,000) drachms (coin no.2 and no.3, plate XII), and the third and last group of 1,600,000 drachms, therefore the third group of 800,000 staters, were marked with the numerical notation from the two obverse dies under examination (coin no.4, plate XII) that is ϜΛ = 6 (Ϝ) x 6 (Λ) = 3,6(00,000) drachms. Well, it could have happened that the obverse dies from the previous numerical tranche, that meant the ones bearing the KI notation, have been used far beyond the numerical threshold announced, and have produced a considerable number of staters entering the final 3,600,000 drachms threshold, normally indicated with ΛϜ, while continuing to carry the KI notation, typical of the previous 2 million drachms threshold. The intense exploitation of the obverse dies in the Aspendos minting die are witnessed by various coins with the obverse almost unreadable compared to the new reverse (see, for example, the coin A, plate II, and the coin A, plate XII) and from the reconstruction made by de Callataÿ about the story of an obverse die bearing exactly the KI monogram that combines with 32 different reverse dies![40] On the other hand even from examination of the issue distinguished by the club symbol emerge traces of a correspondence not always close between the figures shown on the coins and the coin masses minted due to the fact that the obverse and reverse dies remained in use even after the numerical threshold indicated on them was reached.

The number of drachms mostly produced from the obverse dies with the KI notation could have been 900,000, equal to 450,000 staters: this meant that within the last group of coins to mint to end the issue, normally marked by the ϜΛ notation, they did not have to mint more 1,600,000 drachms but only other 700,000 drachms, equal to 350,000 staters. For this reason the normal ϜΛ notation was left but was added the clarification that under the sign of this notation did not have to mint 1,600,000 drachms, equal to 800,000 staters, as usual, but only 700,000 drachms, corresponding to 350,000 staters.

This hypothesis is confirmed by the number of the reverse dies that were matched to the two obverse dies bearing the legend ΕΛΥΨΑΜΕΝΕΤΥΣ or ΜΕΝΕΤΥΣΕΛΥΨΑ: they are even 15 (see plates XIII-XIV) that means a number surely enough to produce 350,000 staters. In fact, if we divide the 350,000 staters that were needed to mint for the 15 reverse dies traced, we notice that each reverse die produced the average of 23,333 coins, that is a smaller number than the 36,764 coins that were obtained from every reverse die of the issue distinguished by the club symbol.

Perfectly admissible, then, is the hypothesis that the two obverse dies with the legend ΕΛΥΨΑΜΕΝΕΤΥΣ or ΜΕΝΕΤΥΣΕΛΥΨΑ produced 350,000 staters. These two obverse dies, in fact, appear to be subject to an intense use like it clearly appears from the coins no.3, pl. XIII, and no.17, pl. XIV, that are characterized by the contrast between the obverse's bad conditions and the sharpness of the reverse's reliefs and the legend that indicates that the obverse's actual condition does not depend on the bad conservation of the coins but on the fact that they were obtained from a tired obverse dies, remained in use even when they were very worn out.

The fact that monograms on Aspendos coins are actual numbers indicating quantities expressed in drachms and not in talents, the unit value normally used to denote large amounts of money, is clearly indicated with gold staters with Alexander the Great in elephant quadriga on the reverse minted by Ptolemy I Soter in 295/4 BC.

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[40] See DE CALLATAŸ F. (2016), p.68-71. Probably these 32 reverse dies belonged to more consecutive issues and the obverse die with the KI numerical notation to which they were matched, were always used by the same *malleator* (mint worker specifically employed in striking the dies) flanked by another *malleator* that used an obverse die bearing the □□ figure and by another one that used an obverse die with the ϜΛ numerical notation: all three *malleatores* struck the issue increasing at the same time all the editions (□□, KI and ϜΛ) and not reaching first the lower editions and then passing on to the following and so on.

The first monogram ⊢ on the left on the reverse of the Ptolemy stater no.1, plate XIV, is formed by an interlacement between a P and a *sampi* (Ͳ), the sign used to indicate the number 900. The number Ͳ is so well defined and clear that it cannot be confused with a Greek letter. It cannot be a T because this letter was without two dashes placed on the sides of the upper horizontal line. The interpretation given by Svoronos[41] of the monogram ⊢ as ⫪, which corresponds a Π within which is engraved a P is questionable. Such interpretation has to be rejected because in the monogram ⊢ the loop of the P is placed not at the end of the vertical central rod but in the middle and this indicates that this rod belongs to a different sign from the P. A further issue with the interpretation given by Svoronos is the fact that the central rod ends well below the two vertical lines of the supposed Π and there is no logical explanation for this. If indeed the long central rod had belonged only to P it could have finished at the Π lateral rod's height and not gone much further down as it does. In this case there would have been no need of the space above the loop of the P. To clarify further, the monogram should have been ⫪ and not ⊢. The unreliability of Svoronos' interpretation in regards to this monogram ⫪, in place of ⊢ within which the main element is a *sampi*, is demonstrated by the fact that the monogram Ⱶ immediately following on the reverse of the same coin no.1, plate XIV, is from the scholar interpreted as ΔP, referring to the central element of the monogram constituted by a Δ when it is quite obvious that it is A suggested by the absence of the lower horizontal line typical of the Δ.

Since the most conspicuous element of the monogram ⊢ appears to be reasonably a *sampi*, that indicates a number and not a letter, the natural assumption would be that even the other element of the monogram, P, is also a number.

Another revealing element is constituted by the apex placed on the right of the second monogram, engraved on the reverse of coin no.2, plate XIV. Remarkably the apex on the right side of the letter was a diacritical mark [42] to aid the reader in decoding that letter is to be read and not as a letter but as a number. It could be assumed, therefore, that the monogram in question followed by an apex was actually composed by numbers and not letters. The apex is well defined and clear, and does not seem to be a defect or a successive breakage of the reverse die at all, but it appears deliberately engraved at the time of the reverse die preparation.

If the two monograms mentioned are composed by numbers, it would be logical to ascertain that all the other monograms engraved on Ptolemy I's gold staters were composed by numbers, exactly as the dates on the coins of the successors of Ptolemy I are composed by numbers. If these dates were not preceded by the Ⳑ symbol in the place of ἔτους, the notion that these were numbers and not letters would have remained unnoticed.

The question arises as to how to interpret the numbers stamped on Ptolemy I Soter gold staters. The first monogram ⊢ on the left on the reverse of the coin no.1, plate XIV, is composed by a *sampi* (Ͳ) which denotes the number 900, reported in ligature with a P that corresponds to the number 100 from the Ionic numbering system. The fact that the two numbers overlap suggest that these must be multiplied together giving the sum of 90,000, following set calculations of two numbers that are compound values from the Attic numbering system, for example, the number 𝌆 is composed by the figure Δ = 10 surmounted by the figure Π = 5 they multiply by each other giving the result of 50. Indeed the multiplication between Ͳ, 900 and P or 100 appears to be the only possible operation between two numbers belonging to the same decimal order of the hundreds. If, for example, after the first number 900, expressed in hundreds, there would have been, instead of the number 100, the number 10, expressed in tens, we could think of two numbers to be read in sequence with 910 as the resulting sum. It cannot be a sum, 900+100=1,000 because in this case it

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[41] SVORONOS J. (1904-1908), p. 24, no. 147.
[42] On the diacritical marks see TOD M. N. (1979), p.136-137.

would have been more logical and convenient to report directly the number 1,000. It is then reasonable to assume that the monogram ₚ is composed by the number T = 900 and by the number P=100 that are multiplied by each other and give a result of 90,000.

The second initial shown on the reverse of the coin no.1, plate XIV, is the Ⅎ monogram that corresponds to 3, Γ, from the Ionic numeral system x 50 (N) x 1,000 from the Ionic system (A=,A=1,000)= 150,000.

In the third numerical notation X on the reverse of coin no.1, plate XIV, we can clearly distinguish an A and X. The A does not indicate the number A′=1 but the number ‚A=1,000 whilst the number X is not the number 600 from the Ionic system but the number 1,000 from the Attic system for which the monogram X is just 1,000 from the Ionic system, ‚A simply written as A to simplify the engraver's work, for the 1,000 number from the Attic system X having the highest value of 1,000,000. Evidently the use within the same figure X of a number taken from the Ionic numbering system and a number taken from the Attic numbering system and, therefore, the irregular use of numerical systems, is the price to pay for obtaining a concise numerical notation that with only two figures intertwined, expressed a high number such as a million. In this stater issue, such a high number can only indicate the size, expressed in drachms. If, therefore, the issue as a whole is of one million drachms size, as a gold staters issue, coins with a two gold drachms value, the staters minted will be 500,000.

The meaning associated with the tern of monograms seems to be the following, coin no.1, plate XIV, belongs to the tranche issue between the 90,000 (ₚ) and the 150,000 staters (Ⅎ) and not drachms, within an issue from a million drachms edition (X) corresponding to 500,000 staters since the value of one staters is 2 drachms, 1,000,000 drachms : 2 = 500,000 staters.

On the next coin no. 2, plate XIV, the first monogram carries out the numerical sequence of staters during the minting process and the second monogram confirms the issue limit expressed in drachms. The numerical notation ᛗ to the left in exergue on the reverse of coin no. 2, plate XIV, is cancelled out by the number 40 of the Ionic system (M) x 10 from the same numeral system, the number I reported below the number M, x Argos' 10 drachms symbol, ⊙ symbol reported above the M. The result was 4,000, standing for 4,000 hundreds staters, equal to 400,0(00) staters. On the other hand, the second numerical notation, in exergue to the right on the reverse of the coin no. 2, plate XIV, that means the ᛗ′ monogram, indicates in another different way the size of the issue, the number 40 of the Ionic system (M) and the number 50 from the same system (N) embedded inside the number 5 of the Attic system (Π), while above the Π we find Argos' 10 drachms symbol, ⊙. The resulting sum of consecutive multiplications between all of these numbers is 100,000 tens of drachms, equal to 1,000,00(0) drachms. As already seen above, the apex found on the right of this complex figure establishes that it is a compendium of numbers and not letters.

Another example can be given, taken from a different Greek coinage, of large quantities shown on the coins these are expressed in drachms and not in talents which indicate the amounts of money minted within that given issue. In the case of the Ptolemy I Soter gold staters a numerical progression occurs, referring to the particular type of coins minted, which were indeed staters, but the end of the issue is always expressed in drachms.

In conclusion it can be ascertained that acronyms on Aspendos staters and on other Greek coins, if considered as compounds not made up of letters but numbers, can become unexpected sources of new and interesting data, and no longer considered as incomprehensible signs.

CATALOGUE

Plate I

I

II

III

1

2

3

4

5

6

Plate II

1

2

3

A

B

C

ξ α ξ	60, 1,	60
ξ β ρκ	60, 2,	120
ξ γ ρπ	60, 3,	180
ξ δ Σμ	60, 4,	240
ξ ε τ	60, 5,	300
ξ ϛ τξ	60, 6,	360

D

Plate III

1) O1-R1   2) O1-R2   3) O1-R3   4) O2-R4   5) O2-R5   6) O3-R6

7) O3-R7   8) O4-R8   9) O4-R9   10) O5-R10   11) O6-R11   12) O7-R12

13) O8-R13   14) O9-R14   15) O10-R15

Plate IV

16) O11-R16   17) O12-R17   18) O13-R18   19) O14-R19   20) O15-R20   21) O16-R21

22) O16-R22 23) O16-R23 24) O16-R24 25) O17-R25 26) O17-R26 27) O17-R27

28) O18-R28 29) O19-R29 30) O19-R30

Plate V

31) O20- R31 32) O21-R32 33) O21-R33 34) O21-R34 35) O22-R35 36) O22-R36

37) O23-R37 38) O24-R38 39) O25-R39 40) O26-R40 41) O27-R41 42) O28-R42

43) O29-R43 44) O30-R44 45) O31-R45

Plate VI

46) O31-R46   47) O31-R47   48) O31-R48   49) O32-R49   50) O32-R50   51) O33-R51

52) O34-R52   53) O35-R53   54) O36-R54   55) O37-R55   56) O37-R56   57) O37-R57

58) O37-R58   59) O37-R59   60) O37-R60

Plate VII

61) O38-R61   62) O38-R62   63) O39-R63   64) O39-R64   65)O40-R65   66) O41-66

67) O42-R67   68) O43-R68

A. The symbol of the metretes carried on obverse dies O14, O15 and O16 (coins from no.19 to no.24, plate IV).

$$= 10(I)\times100(P)\times3(\Gamma)=3,000(,000) \text{ drachms}$$

$$= YK = 4,20(00,000) \text{ drachms}$$

B. Interpretation of the numerical notation carried on the obverse of the coin no.41, plate V (coin at top) and the coin no. 45, plate V (coin at bottom).

Plate VIII

1   2   3   4   I   II

Εἰρηναῖος Πρω(τάρχῳ) τρα(πεζίτῃ) χα(ίρειν)
χρη(μάτισον) Σαραπίωνι τῶι
παρὰ Θέωνος χα(λκοῦ) **⋊** τέσσαρας / δ̄.

A. The text transcript of an Egyptian papyrus dated 86 BC, under the reign of Ptolemy IX, containing a payment order for a banker which says: "Eirenaios to Protarchos, banker, greeting. Pay to Serapion the agent of Theon four copper talents, that is, 4" (BAGNALL R.S., BOGAERT R., 1975, p.84).

Plate IX

1

2

No Sign;   = **M**(40) x **Π**(5) x **I** (10) x **E**(5) = 1,000,0(00) dr.;

3

4

= **H**(100) x **Λ**(30) x **Π**(5) = 1,500,0(00) dr.;   = **K** =2,0(00,000) drachms;

5

6

= **K** (20) x **A** (1,000) = 2,000,0(00) dr.;

B (2) x **H** (100) x **Λ** (30) x **Π** (5) = 3,000,0(00) dr.

7) eagle symbol;

8) star symbol;

9) caduceus symbol;

10) spear-head symbol;

Plate X

11) laurel wreath symbol

12) Phrygian helmet symbol

13) lyre symbol

R1   R2   R3   R4   R5

I) IΔ = 14   II) IE= 15   III) IᏟ = 16

IV) I⊥ = 17

Plate XI

1) A= 1   2) B = 2   3) Γ= 3

4) E = 5   I) KΔ= 24   II) KᏟ= 26

III) K⊥= 27   IV) KΘ= 28

Plate XII

The inscription ΕΛΥΨΑΜΕΝΕΤΥΣ and ΜΕΝΕΤΥΣΕΛΥΨΑ shown in exergue on the obverse of some staters minted in Aspendos (Pamphylia) in 400-380 BC (the coin I of this figure is no.3, plate XIII, and the coin II of this figure is no.4, plate XIII).

1   2   3

4   A

Plate XIII

1) O1-R1   2) O1-R2   3) O1-R3   4) O2-R1   5) O2-R1   6) O2-R4

7) O2-R5   8) O2-R6   9) O2-R7   10) O2-R8   11) O2-R9   12) O2-R10

Plate XIV

13) O2-R11   14) O2-R12   15) O2-R13   16) O2-R14   17) O2-R15

1

₱ = ₱ = Ionic 900 (T) x Ionic 100 (**P**) = 90,000 staters;

Ⱥ = Ⱥ = Ionic 1,000 (**,A**=**A**) x Ionic 50 (**N**) x Ionic 3 (**Γ**) = 150,000 staters;

Ⱥ = Ⱥ = Ionic 1,000 (**,A**=**A**) x Attic 1,000 (**X**) = 1,000,000 drachms.

2

= = Ionic 40 (**M**) x Ionic 10 (**I**) x Argive 10 (**Ⓞ**)= 400,0(00) staters;

= = Attic 5 (**Π**) x Ionic 40 (**M**) x Ionic 50 (**N**) x Argive 10 (**Ⓞ**) = 1,000,00(0) drachms.

LIST OF COINS

Plate I

Coin I: Jesús Vico S.A., Subasta online 2, 15 Sept.2015, lot 58, 10.9 g;
Coin II: CNG, Electronic Auction 324, 9 Apr. 2014, lot 154, 10.86 g;
Coin III: Auktionshaus H.D. Rauch GmbH, Auction 77, 10 Apr.2006, lot 251, 10.90 g.
No.1: Gerhard Hirsch Nachfolger, Auction 306, 12 Feb. 2015, lot 1857, 10.82 g;
No.2: CNG, Auction 36, 27 Aug.2001, lot 63939, 10.97 g;
No.3: Fritz Rudolf Künker GmbH & Co. KG, Auction 143, 6 Oct. 2008, lot 230, 10.95 g;
No.4: Numismatik Naumann, Auction 24, 2 Nov.2014, lot 234, 10.95 g;
No.5: Auktionshaus H. D. Rauch GmbH, Auction 77, 10 Apr.2006, lot 250, 10.90 g;
No.6: Gorny & Mosch Giessener Münzhandlung, Auction 190, 10 Nov.2010, lot 308, 10.88 g.

Plate II

No.1: eBay (CNG seller), Item # 1248393904 started 2 Jun.2001, 10.92 g;
No.2: CNG, Mail Bid Sale 60, 22 May 2002, lot 854, 10.84 g;
No.3: CNG, Mail Bid Sale 66, 19 May 2004, lot 509, 10.88 g.
Coin A: London Ancient Coins Ltd, Auction I, 31 Jan.2014, lot 94, 10.44g.
Coin C: Classical Numismatic Group, Auction no.25, London March 2005, lot no.61986.

Plate III-VII

No.1: Gerhard Hirsch Nachfolger, Auction 264, 25 Nov.2009, lot 308, 10.70 g;
No.2: Gerhard Hirsch Nachfolger, Auction 264, 25 Nov.2009, lot 308, 10.38 g;
No.3: CNG, Electronic Auction 186, 16 Apr. 2008, lot 38, 10.48 g;
No.4: Heritage Auctions, 2006 (World Coins) June Long Beach Signature Auction, 2 June 2006, lot 12047, 9.79 g;
No.5: Gorny & Mosch Giessener Münzhandlung, Auction 190, 10 Nov. 2010, lot 309, 9.75 g;
No.6: Roma Numismatics, Auction 5, 23 March 2013, lot 402, 10.43 g;
No.7: CNG, Auction 61, 25 Sept.2002, Lot 770, 10.30 g;
No.8: Fritz Rudolf Künker GmbH & Co. KG, Auction 83, 17 June 2003, lot 372, 10.30 g;
No.9: CNG, Mail Bid Sale 64, 24 Sept.2003, lot 303, 10.26 g;
No.10: n.49: CNG, We Shop 776825, 10.49 g;
No.11: CGB.fr, Monnaies 38, 30 April 2009, lot 258, 10.41 g;
No.12: Classical Numismatic Group, Electronic Auction 317, 18 Dec. 2013, lot 87, 9.91 g;
No.13: CNG, Electronic Auction 186, 16 Apr. 2008, lot 35, 10.20 g;
No.14: Auktionshaus H. D. Rauch GmbH, Auction 101, 19 Apr.2016, lot 1377, 8.49 g;
No.15: Münzen & Medaillen Gmb, Auction 10, 22 March 2002, lot 228, 9.61 g;
No.16: CNG, Electronic Auction 186, 16 Apr. 2008, lot 37, 10.00 g;
No.17: VAuctions, Auction 255, 18 Nov.2010, lot 31, 9.71 g;
No.18: Freeman & Sear, Mail Bid Sale 12, 28 Oct.2005, lot 153, 10.34 g;
No.19: Fritz Rudolf Künker GmbH & Co. KG, Auction 89, 8 Mar.2004, lot 1423, 10.07 g;
No.20: CGB.fr, Monnaies 25, 26 Jan.2006, lot 104, 10.27 g;
No.21: CNG, Electronic Auction 367, 27 Jan. 2016, lot 237, 10.40 g;
No.22: Münzen & Medaillen GmbH, Auction 31, 23 Oct. 2009, lot 57, 10.35 g;
No.23: Numismatik Lanz München, Auction 125, 28 Nov.2005, lot 413,10.23 g;
No.24: Ira & Larry Goldberg Coins & Collectibles, Auction 55, 29 Oct.2009, lot 70, 9.76 g;
No.25: CNG, Electronic Auction 368, 10 Feb. 2016, lot 104, 10.42 g;
No.26: CNG, Auction 26, lot 62157, 9.93 g;
No.27: CNG, Electronic Auction 369, 24 Feb. 2016, lot 171, 10.21 g;
No.28: CNG, Electronic Auction 362, 28 Oct. 2015, lot 193, 10.12 g;
No.29: CNG, Electronic Auction 380, 10 Aug. 2016, lot 259, 10.29 g;
No.30: CNG, Electronic Auction 213, 1 July 2009, lot 158, 10.49 g;
No.31: CNG, Electronic Auction 379, 27 July 2016, lot 155, 10.23 g;
No.32: Gerhard Hirsch Nachfolger, Auction 248-249, 6 Feb.2007, lot 1504, 10.70 g;
No.33: Adolph E. Cahn, Katalog 75, 30 May 1932, lot 371, 10.18 g;
No.34: eBay Item #8375496068 started 15 Aug. 2009, 10.10 g;
No.35: Vcoins, Barry P.Murphy, item16556, 12 Jan.2006, 10.23 g;
No.36: UBS Gold & Numismatics, Auction 59, 27 Jan.2004, lot 5813, 10.37 g;
No.37: eBay Item #284442207 started 15 March 2000 (seller CNG), 10.39 g;
No.38: Numismatik Naumann, Auction 37, 1 Nov.2015, lot 304, 10.49 g;
No.39: eBay, item #838573493 started 17 Feb.2006, 9.87 g;
No.40: Roma Numismatics, E-Sale 29, 27 Aug.2016, lot 216, 10.08 g;
No.41: iNumis; Mail Bid Sale 14, 25 March 2011, lot 92, 10.32 g;
No.42: Gerhard Hirsch Nachfolger, Auction 248-249, 6 Feb.2007, lot 1503, 10.40 g;
No.43: CNG, Electronic Auction 304, 12 June 2013, lot 111, 10.71 g;
No.44: Warszawskie Centrum Numizmatyczne, Auction 58, 8 Nov.2014, lot 1, 10.21 g;
No.45: CNG, Electronic Auction 376, 15 June 2016, lot 223, 10.44 g;
No.46: CNG, Electronic Auction 361, 14 Oct. 2015, lot 741, 10.82 g;
No.47: CNG, Electronic Auction 383, 28 Sept. 2016, lot 207, 10.02 g;
No.48: CNG, Electronic Auction 374, 11 May 2016, lot 281, 10.44 g;
No.49: CNG, Electronic Auction 378, 13 July 2016, lot 200, 10.53 g;
No.50: CNG, Electronic Auction 368, 10 Feb. 2016, lot 103, 10.55 g;

No.51: CNG, Electronic Auction 377, 29 June 2016, lot 144, 10.14 g;
No.52: CNG, Electronic Auction 322, 12 March 2014, lot 309, 10.06 g;
No.53: CNG (eBay), 9 Feb.2000, 9.65 g;
No.54: Savoca Numismatik, Live Online Auction 5, 8 Nov.2015, lot 230, 9.83 g;
No.55: Gorny & Mosch Giessener Münzhandlung, Auction 129, 8 Mar.2004, lot 169, 9.88 g;
No.56: Maison Palombo, Auction 15, 22 Oct.2016, lot 21, 10.16 g;
No.57: Sincona AG, Auction 10, 27 May 2013, lot 180, 10.73 g;
No.58: Stack's Bowers Galleries, January 2013 N.Y.I.N.C., 8 Jan.2013, lot 5537, 10.57 g;
No.59: Münzen & Medaillen GmbH, Auction 31, 23 Oct. 2009, lot 56, 10.15 g;
No.60: Bruun Rasmussen, Auction 774, 13 June 2007, lot 5676, 10.00 g;
No.61: Ira & Larry Goldberg Coins & Collectibles, Auction 81, 2 Sept.2014, lot 1527, 10,20 g;
No.62: CNG, Electronic Auction 271, 11 Jan. 2012, lot 283, 10.71 g;
No.63: Myntauktioner i Sverige AB, Auction 20, 9 Sep.2016, lot 41, 10.76 g;
No.64: CNG, Mail Bid Sale 76, 12 Sept. 2007, lot 754, 10.72 g;
No.65: Heritage Auctions, 2000 June Long Beach Signature Sale, 13 June 2000, lot 5111, 10.71 g;
No.66: Gerhard Hirsch Nachfolger, Auction 262-263, 22 Sept. 2009, lot 2472, 10.84 g;
No.67: Maison Palombo, Auction 5, 7 June 2008, lot 43, 10.66 g;
No.68: Jean Elsen & ses Fils S.A., Auction 130, 10 Sep.2016, lot 70, 10.53 g.

Plate VIII

No.1: Vcoins, Tom Vossen, Item #21135, 1 Nov. 2007, 3.17 g;
No.2: eBay, Item # 8387146190, 21 Feb.2006, 3.58 g.;
No.3: Fritz Rudolf Künker Münzenhandlung, Auction 133, 11 Oct. 2007, lot 7682, 1.87 g;
No.4: Auktionshaus H. D. Rauch GmbH, Summer Auction 2011, 19 Sept.2011, lot 335, 2.23 g;
coin I: Gorny & Mosch Giessener Münzhandlung, Aution 237, 7 March 2016, lot 10120, 2.71 g;
coin II: Solidus Numismatik, Auction, Online-Auktion 9, 7 Oct.2016, lot 19, 16 mm, 2.72 g.

Plate IX-X

No.1: Münzen & Medaillen GmbH, Auction 11, 7 Nov.2002, lot 729, 10.43 g;
No.2: Dr. Busso Peus Nachfolger, Auction 399, 4 Nov.2009, lot 181, 10.68 g;
No.3: Dr. Busso Peus Nachfolger, Auctions 407/408, 7 Nov. 2012, lot 838, 10.41 g;
No.4: Dr. Busso Peus Nachfolger, Auctions 407/408, 7 Nov. 2012, lot 839, 10.34 g;
No.5: Naville Numismatics, Live Auction 7, 11 May 2014, lot 60, 10.50 g;
No.6: Leipziger Münzhandlung und Auktion Heidrun Höhn, Auction 78, 13 Sept. 2013, lot 1147, 10,20 g;
No.7: Heidelberger Münzhandlung Herbert Grün e.K., Auction 64, 20 Nov.2014, lot 1197, 10.42 g;
No.8: Roma Numismatics, Auction 2, 2 Oct. 2011, lot 319, 10.48 g;
No.9: Gorny & Mosch Giessener Münzhandlung, Auction 133, 11 Oct.2004, lot 243, 10.43 g;
No.10: Auktionshaus H. D. Rauch GmbH, Auction 86, 12 May 2010, lot 379, 10.35 g;
No.11: Classical Numismatic Group, Mail Bid Sale 63, 21 May 2003, lot 578, 10.66 g;
No.12: LHS Numismatik AG, Auction 102, 20 Apr.2008, lot 303, 10.58 g;
No.13: CNG, Electronic Auction 222, 11 Nov. 2009, lot 188, 10.21 g.
R1: LHS Numismatik AG, Auction 102, 20 Apr.2008, lot 303, 10.58 g;
R2: Roma Numismatics, Auction 2, 2 Oct. 2011, lot 318, 10.37 g;
R3: CNG, Triton XVI, 8 Jan. 2013, lot 514, 10.40 g;
R4: Pegasi Numismatics, Auction XXVIII, 29 May 2013, lot 193, 10.57 g;
R5: Fritz Rudolf Künker GmbH, Auction 104, 27 Sept.2005, lot 286, 10.14 g.
Coin I: Ira & Larry Goldberg Coins & Collectibles, Auction 78, 28 Jan.2014, lot 2311, 16.5 g;
Coin II: CNG, Electronic Auction 381, 24 Aug. 2016, lot 204, 16.66 g;
Coin III: CGB.fr, Monnaies 31, 21 June 2007, lot 75, 16.65 g;
Coin IV: Roma Numismatics, E-Sale 2, 2 Nov.2013, lot 176, 16.64 g.

Plate XI

No.1: Roma Numismatics, e-Sale 4, 28 Dec.2013, lot 181, 16.58 g;
No.2: Roma Numismatics, e-Sale 4, 28 Dec.2013, lot 180, 16.58 g;
No.3: CNG, Electronic Auction 380, 10 Aug. 2016, lot 260, 15.99 g;
No.4: Numismatik Lanz München, Auction 123, 30 May 2005, lot 195, 16.94 g.
Coin I: CNG, Electronic Auction 258, 22 June 2011, lot 200, 16.61 g;
Coin II: Fritz Rudolf Künker GmbH, Auction 89, 8 Mar. 2005, lot 1428, 16.81 g;
Coin III: VAuctions, Auction 263, 5 May 2011, lot 16, 15.91 g;
Coin IV: Fritz Rudolf Künker, eLive Auction 23, 30 Oct. 2013, lot 30, 16.59 g.

Plate XII

No.1: Numismatik Lanz München, Auction 138, 26 Nov.2007, lot 430, 10.90 g;
No.2: ACR Auctions, E-Auction 4, 19 Mar.2012, lot 70, 10.50 g;
No.3: CNG, Electronic Auction 180, 23 Jan. 2008, lot 47, 10.76 g;
No.4: Gorny & Mosch Giessener Münzhandlung, Auction 122, 10 Mar.2003, lot 1472, 10.81 g.
Coin A: ACR Auctions, Auction 5, 14 May 2012, lot 241, 10.88 g.

Plate XIII-XIV

No.1: Gorny & Mosch Giessener Münzhandlung, Auction 122, 10 Mar.2003, lot 1472, 10.81 g;
No.2: Stack's Bowers Galleries, Sale #154-June 2010 Baltimore Auction, 17 June 2010, lot 8058, 10.93 g;
No.3: eBay (CNG seller), Item # 64569, 10 Oct.2001, 10.96 g;
No.4: Gorny & Mosch Giessener Münzhandlung, Auction 121, 10 Mar.2003, lot 199, 10.74 g;
No.5: Münzen & Medaillen GmbH, Auction 14, 16 Apr. 2004, lot 584, 10.92 g;
No.6: Münzen & Medaillen AG Basel, Auction 94, 16 Dec. 2003, lot 435, 10.92 g;
No.7: Gemini LCC, Auction III, 9 Jan.2007, lot 209, 11.08 g;
No.8: Vcoins, Ancient Delights, 20/08/2009, 10.5 g;
No.9: CNG, Electronic Auction 115, 25 May 2005, lot 125, 10.56 g;
No.10: Gorny & Mosch Giessener Münzhandlung, Auction 204, 5 Mar.2012, lot 1566, 10.85 g;
No.11: eBay (CNG), 26 Apr. 2000, 10.77 g;
No.12: Gorny & Mosch Giessener Münzhandlung, Auction 142, 10 Oct.2005, lot 1578, 10.70 g;
No.13: CNG, Auction 32, Lot 63214, 10.76 g;
No.14: Gorny & Mosch Giessener Münzhandlung, Auction 121, 10 Mar.2003, lot 200, 10.44 g;
No.15: CNG, Auction 29, lot 62629, 10.92 g;
No.16: CNG, Auction 29, lot 62629, 10.92 g;
No.17: CNG, e-Auction 71, 20 Aug.2003, lot 17, 10.52 g.
No.1: Numismatica Ars Classica, Auction 88, lot 451, 8/10/2015, 7.04 g, 17.00 mm;
No. 2: Museum of Fine Arts Boston, no. 14.421, 17 mm, 7.10 g, 17.80 mm.

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