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# GREEK COINAGE AND PERSIAN BIMETALLISM

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In this article ancient coinage in the Eastern part of the Mediterranean, from the beginning till the time of Alexander, is treated as a profit-making business. And as the profit depends in the last resort on the prices of the raw material, gold and silver, it could be properly called a study in the prices of these metals, which were, as I hope to show, largely dominated by the Lydian and Persian efforts towards bimetallism.

As is well known, coins were struck for the first time in Lydia, after 640 [1]. But of course, coinage had its prehistory. In Ancient Mesopotamia, with its highly developed banking system, metal currency in the form of lead, silver and copper bars, bearing the seal of a particular city or temple, are known to have existed. This seal often gave an indication of the purity of the metal. In Greece, however, a more primitive kind had survived. From Minoan times on metal tool money had circulated in the form of spits (obeloi), axes, ox-hides, tripods etc. This money was acceptable not because of its intrinsic value, but like other types of primitive money, because of its traditional shape and well-known general aspect. In Lydia, an eastern kingdom under strong Greek influence, East and West met, and from this meeting coinage sprung [2].

Hence coinage kept its ambiguous character. The current definition of a coin as a handy piece of metal stamped by a responsible authority to guarantee its intrinsic value and weight [3], seems to be too much influenced by the theory of the gold standard. Most coins were issued at a rate higher than the intrinsic value of the metal, for most mints tried to make a profit. The difference in value between the raw material and the finished product must be found either in quantity or in quality, i.e. in weight or in alloy. In the former case the metal is pure, but the difference in value between coin and bullion becomes apparent at once by weighing. In the latter case analysis of the metallic content can be difficult, which leaves some room for deceiving the public.

To compensate for their lack of material value many Greek coins were made as works of art. For instance, Cyzicus, Phocaea and Mytilene, the

three only cities that issued electrum coins on a large scale, employed first-rate artists to design a wholly new type every year. It seems certain that the intrinsic value of these coins, made of a variable alloy of gold and silver, was far below their market rate. In general, all ancient coins were overvalued at their place of issue. Some electrum coins, such as the Cyzicene ones,were accepted as international trade coins, but most other coins lost their surplus value abroad. Coins of pure gold and silver could, however, be treated as bullion. Xenophon, writing in 354, inform us that all Greek coins lost part of their value outside their parent cities, except Attic silver,which could be exported even with profit [4].

This is proved by an inscription of the annual Treasurers of Athena at the Parthenon in Athens during the Peloponnesian War. It shows that accounts of coins were kept in the following classes: silver Attic coin was merely counted; for foreign silver, coined and bar, the weight determined the value; with electrum coins the number of coins was stated and immediately translated into its value in Attic silver, and bar gold was weighed and then translated into Attic silver at a given rate of exchange [5]. This inscription makes it clear that both Attic silver coins and foreign electrum coins were tariffed. Unfortunately the exact rate for electrum coins was not stated on the stone.

The Lydian kings were masters of the fabulous mines of Tmolus and Pactolus, where natural electrum was mined. Their electrum coins were struck in divisions — the *trite* or third being the most common — of a stater of 14.28 gm of the so-called Phoenician standard. Herodotus says that the Lydians were the first tot strike silver and gold [6]. These coins are a gold stater of 10.71 gm, and a silver stater of 10.56 gm. They were clearly meant to be of equal weight; the small difference may have been due to the fact that the cost of striking silver took a higher percentage [7].

Croesus may have been responsible for an important innovation: the weight of the gold stater was lowered by ¼ to 8.05 gm. Cyrus, who conquered the kingdom of Croesus in 546, continued, like his successor Cambyses, the issue of Croeseid coins, but in coarser style. In this style almost all silver half staters or drachms were struck. When Darius shortly after 516 introduces the first truly Achaemenid coins, the *daric* or heavy gold shekel, and *siglos* or light silver shekel, he first strikes darics of the weight of the Lydian gold stater. But soon Darius strikes darics of 8.35 gm, the standard of the Persian, or ancient Babylonian, heavy gold shekel. After some time the weight of the siglos was raised from 5.35 gm, the weight of the Lydian drachm, to 5.55 gm, and there it remained [8]. Suda and Harpocatium give a value of 20 drachms for the daric in their

dictionaries. Cyrus the Younger, who in 401 had promised to pay 10 talents to his soothsayer Silanus, pays him 3000 darics [9]. One talent of silver being 6000 drachms, this gives 20 drachms to the daric. We meet the same equivalence of one talent of silver to 300 darics in a story told by Arrianus: Alexander promises the first soldier to scale an impregnable fortress 12 talents of silver, the next 11 and so on, till the last receives 300 darics [10]. In addition we may note that, according to Philostratus, in Syria a find was made of 3000 darics, while in the canal of Xerxes near Athos there were actually found 300 darics together with 100 Athenian tetradrachms. Probably 300 darics represented a unit, being one talent of silver [11]. Thus from the beginning to the end the Persian daric, or gold stater, was worth 20 sigloi, or silver drachms, which makes the Persian system bimetallic in principle. This was the general opinion [12], till it was denied by Schlumberger. According to him the siglos played too unimportant a rôle in the Persian Empire to be called the official Persian silver coinage on a par with the daric [13]. This, however, is not the point. Actual Persian weights make it clear that the Persians employed two different sets of weights — in the proportion of $13\,{}^{1}/_{3} : 1$ — for gold and silver [14]. Thus weights and coins alike prove that the Achaemenids regarded a fixed relation between gold and silver as one of their immovable institutions, as a law of the Medes and Persians.

The daric is a stater or heavy shekel of the ancient Babylonian gold standard. The *siglos*, being a drachm or light shekel, is in fact ½ stater or ½ heavy shekel of the so-called Babylonian silver standard. The weights of siglos and daric are as 2:3. The values of siglos and daric are as 1:20, and so of silver stater and gold stater as 1:10, which gives a rate of Au:Ar =40:3, or $13\,{}^{1}/_{3}$:1 [15].

Dar: Sig = 3:2 in weight
Au: Ar = 40:3 in value

Au Dar: Ar Sig = 120:6 or 20:1 in value.

Attempts to find back these two different weight systems in ancient Babylonia [16], and thus the rate of $13\,{}^{1}/_{3}$:1, have been unsuccessful and must be ascribed to nineteenth-century pan-babylonism. Only the gold unit of 8.35 gm is Babylonian, and from this at the rate of $13\,{}^{1}/_{3}$:1 the silver so-called Babylonian standard was derived [17].

The rate of 13 1/3:1 itself derived from the Lydian coin system. For also in the weights of the light Croeseids this same rate appears. Here

also we arrive at the rate of 13 1/3:1 when we take 20 silver drachms making one gold stater (5.35 x 20=107 gm, 8.05 x 13.3=107,065 gm). We now see what happened. Darius first tried, when creating a Persian coinage, to go over to the Babylonian gold standard without changing the Lydian standard for silver. But this made the rate of Au:Ar about 13:1 (a rate, incidentally, given by Herodotus): 5.35 x 20 = 107 gm, 8.35 x 12.8 = 106.88 gm. After some time it appeared that the rate of $13^1/_3$:1 was too important to be ignored, and the siglos was consequently raised to 5.55 gm (5.55 x 20 = 111 gm, 8.35 x 13.3 = 110.5 gm) [18].

What exactly was this rate of 13 1/3:1, or rather 40.3, which at first sight looks so unpractical, but on the other hand could not lightly be abandoned? The heavy gold stater of Croesus weighed 10.71 gm, which is exactly 3/4 of the Lydian electrum stater of 14.28 gm. It looks as if both staters were of equal value. If this should be so, we should have a rate of Au:El=4:3, and if we then take the rate of El:Ar=10:1 we arrive again at the rate of 40:3 for Au:Ar [19].

It seems obvious that the ugly rate of 13 1/3:1 was arrived at through the combination of two neat ones, Au:El=4:3 and El:Ar=10:1.

We here meet an unexpected consequence. For if Lydian electrum coins really were issued at this rate, they were enormously overvalued and we must regard the origin of coinage as a swindle [20]. For this rate corresponds to electrum of 73 % gold and 27 % silver [21]. Analysis of Lydian electrum by specific gravity method has shown, however, that the gold content varies from 31—55% [22]. It is difficult to see how this difference could have been kept a secret for long, especially to the Lydian bankers who knew how to use the "Lydian touchstone" [23]. But if, on the other hand, the real composition of the electrum coins were known, it becomes unbelievable that such an overvalued coinage ever became popular with a public unused to fiduciary coinage, or, for that matter, to any coinage at all.

The extreme instability of the gold content lends some probability to the view that Lydian coins were made of natural electrum, mined from veins of varying richness [24]. The weights are remarkably accurate [25], whereas with tariffed money we should expect some carelessness as to the precise quantity of the metal [26]. To the Lydian electrum tritai are commonly associated other electrum coins, many with indistinct types. These must have been private bankers' issues [27], and cannot, for that reason, have been overvalued at the time of issue. Lydian electrum coins, together with these other coins, and pieces of jewellery, were found together in the famous basis deposit of the Artemision at Ephesus, dated

c. 600. It is a definite bullion hoard, and it may even represent a cross-section of the monetary circulation of the moment [28].

This proves that the earliest Lydian coins were issued at their intrinsic value. We might call electrum "halfgold" and take the proportion of Au:El=2:1 intrinsically, which corresponds to electrum of 47.6 % gold, as is indeed more or less the composition of Lydian coins. These early Lydian issues must now be classed together with the Mesopotamian bars, and might be defined as electrum pellet money, bearing the Royal stamp as a guarantee of origin.

There is another argument that makes it impossible to believe that the rate Au:El=4:3, El:Ar=10:1, which is responsible for the notion that the earliest electrum was overvalued, was valid in the beginning in Lydia. For if it was advantageous to the Lydian kings to strike electrum of c. 47 % gold at the rate of 3:4 to gold and 10:1 to silver, which should correspond to electrum of 73 % gold, it is clear that this advantage was immediately lost in the coinage of pure silver and gold at the same rate. One had to run into the expense of refining the natural electrum into gold and silver, whereas from the same amount of electrum much more valuable electrum coins could be produced. The fact remains, however, that the Lydians did strike gold and silver coins at the rate of 13 1/3:1. So if Croesus was the first to do so it is difficult to see how he became so rich. The answer may be that he was rich enough to afford it. Head and others thought that he was forced to do so because of the general discredit the electrum coinage was falling to [29]. However, the abundant electrum coinage of Cyzicus reaches its peak just in the second half of the sixth century [30].

There is still another objection. How could one, at the rate of 13 1/3:1, exchange the silver stater for the gold stater of the same weight? One needed 40 silver staters for three gold staters, or 13 1/3 silver stater for one gold one. Of course the same amount is needed in exchange for the electrum stater of the same value as the gold one. On the other hand we have such a beautiful rate of 10:1 for El. and Ar. We should expect to have a silver stater of 14.28 gm, especially because this Phoenician standard had already been used for the striking of silver in Phocaea and for the earliest coins of the Santorin class [31].

One could reply that when the heavy gold stater was struck the heavy silver stater did not yet exist, and that this silver stater came into being only together with the light gold stater and the silver half stater [32]. This is possible, though I wonder whether one really can dissociate the heavy gold and silver issues.

However, as Giesecke has pointed out, the heavy gold and silver staters become readily intelligible if we take the gold and silver rate as 12:1. For it is by no means unusual to find a smallest denomination, here the twelfth stater, of the expensive metal to be of the same worth as the largest denomination of the cheaper metal, the silver stater [33].

We have now to decide the relation of these gold and silver coins to the electrum. The weights of gold and electrum are in the proportion of 3:4, their value we take as 2:1

Au st : El st = 3:4 in weight
Au : El = 2:1 in value

Au st : El st = 6:4, or 3:2.

The weights of electrum and silver coins are in the proportion of 4:3, and their value must be in the proportion of 6:1

El st : Ar st = 4:3 in weight
El : Ar = 6:1 in value

El st : Ar st = 24:3, or 8:1. This makes the system 2 Au = 3El = 24 Ar staters.

We can tabulate the known denominations as fellows:

| Au | El | Ar | | |
|---|---|---|---|---|
| 2 st = | 3 st = | 24 st | | |
| 1 st = | 6 x ¼ st = | 12 st | | |
| 2 x ⅓ st = | 1 st = | 8 st | | |
| – | ⅓ st = | 8 x ⅓ st; | 4 El. ⅓ st + 1 El. ⅙ st | = 1 Au st |
| ⅓ st = | 2 x ¼ st = | 4 st | | |
| ⅙ st = | ¼ st | 2 st; | 6 El ¼ st | = „ „ „ |
| – = | ⅙ st = | 4 x ⅓ st; | 9 El ⅙ st | = „ „ „ |
| 1/12 st = | 3 x 1/24 st = | 1 st; | 12 Ar st | = „ „ „ |
| – | 1/12 st = | 2 x ⅓ st; | 18 El 1/12 st | = „ „ „ |
| – | (3 x 1/48 st) | ½ st; | (24 Ar ½ st | = „ „ „) |
| – | 1/24 st = | ⅓ st; | 36 El 1/24 st or Ar ⅓ st | = „ „ „ |
| – | 1/48 st = | ⅙ st; | 72 El 1/48 st or Ar ⅙ st | = „ „ „ |
| – | 1/96 st | 1/12 st; | 144 El 1/96 st or Ar 1/12 st | = „ „ „ |

One misses the electrum half stater or drachm, but it may have been supplied by drachms of the same standard struck in neighbouring cities like Miletus.

It certainly looks surprising that there should be no ninth gold stater, by which only could be expressed the very common electrum third = two ninth staters, and the sixth = one ninth stater. But on the other hand, one gold stater is four tritai and one sixth, or six fourths, nine sixths etc. We may notice the stategic rôle played by the fourth and sixth stater in the electrum series, and of the third stater in the silver series. On the whole the correspondence between the silver and electrum series is very satisfactory (the silver halfstater probably had not yet been struck), especially in the smallest denominations, (the smallest denomination in electrum = the same in silver; 144 of these go on the gold stater), while the correspondence between the gold and silver series is of course perfect. There is no other likely proportion of the three metals that gives better results.

The introduction of the light gold staters can be attributed to Croesus. They were called after him *Kroiseioi stateres* [34], and during the excavations at Sardis a pot hoard was found of light staters of fine style only. This hoard has been related with good reason to the siege of Sardis of 546 [35]. On the other hand the foundation deposit of the palace of Darius in Persepolis contained light gold Croeseids of coarse style only, together with Greek silver coins [36]. Thus the light Croeseids of coarse style belong to the Achaemenids, before the introduction of the daric [37], which must have happened shortly after 516. The heavy gold and silver coins must belong either to the first years of Croesus, or to the reign of his predecessor Alyattes [38].

In any case Croesus was responsible for the introduction of the light gold stater, and therefore of the rate of 13 1/3:1. He may have been struck by the fact that the heavy gold stater was exactly 3/4 of the electrum stater, and, like so many modern numismatists [39], have decided that they should be of equal value. By doing so he automatically introduced the rate of Au:El=4:3, which made his electrum heavily overvalued. It looks as if he wanted to proclaim that 73 % gold really was the composition of his electrum, for he dedicated a gold lion in Delphi, resting on gold and electrum bricks of identical dimensions. But whereas the gold blocks weighed 2½ talents, the electrum blocks weighed 2 talents [40]. From this it has been possible to deduce the gold percentage of the electrum blocks, which is 71 % [41].

We now understand why Croesus lowered the gold stater by 3/4 to 8.05 gm. It made the gold and silver once more interchangeable. But now one paid 10 silver staters for one light gold stater, as formerly 12 silver staters for one heavy gold stater. This must have helped to make his

monetary revolution acceptable to the public, who may not have seen at once that gold coins had become more expensive.

This they undoubtedly had, for by introducing the legal rate of 13 $^1/_3$:1 against a market rate of 12:1, he automatically overvalued his gold. This may serve to explain why he struck so many gold staters, while on the other hand the corresponding silver staters and half staters of good style are excessively rare.

But what happened to electrum? Gresham's law must have started operating together with the first monetary manipulation, and the heavily overvalued electrum must have striven to drive the gold and silver from circulation, while a run on the mint must have changed its gold and silver treasures into one of cheap electrum. It is clear that such a heavily overvalued electrum coinage was in the long run impossible to maintain. But the facts force us to the conclusion that the electrum was heavily overvalued, and was interchangeable against a less overvalued gold coin and a silver coin of more or less intrinsic value. Croesus must have realised the dangers of this situation sooner or later, and have cancelled the overvaluation of electrum. Electrum anyway did not fit into his system after the reduction of the gold stater. If he had really wanted to keep an electrum coinage, he should have created an electrum stater of 10.71 gm, $^4/_3$ of the gold stater, and $^3/_4$ of the old electrum stater of 14.29 gm, or at least have started striking quarter staters on a large scale. Nor did his successors the Persians strike electrum. That was left to Greek cities like Cyzicus, Phocaea and Mytilene.

The effect of the overrated gold must have been a steady import of gold with a similar export of silver. But before this became a matter of serious concern, the Persians took over Croesus' gold and silver rate together with his kingdom. And the Persians had bigger resources of silver at their disposal [42].

There is definite proof that the market rate of gold and silver was, in the first half of the fifth century in the Smyrna region, somewhat more than 13 $^1/_3$:1. Recently a few big hoards of sigloi only, of Croeseid and Achaemenid type, have come to light. Two of them have been published: the Tschal hoard, found near Smyrna, of 432 + Croeseid sigloi and 1045+ Achaemenid sigloi, and another hoard from Smyrna, of 1 Croeseid siglos and 255 Achaemenid sigloi [43]. These hoards prove that silver sigloi must have been overvalued in the Smyrna region at the time of their burial. Two such enormous hoards with no other silver make that conclusion inevitable. Also it is clear that light Croeseids, light early Achaemenid sigloi and later heavier sigloi were treated as being of

the same worth. This gives additional proof of the fact that the intrinsic value of the silver was neglected.

This overvaluation of the silver coins must have been a direct result of a rate for bullion gold and silver which was higher than 13 $^1/_3$:1. As soon as the rate dwindled to 13 $^1/_3$:1, however, the overvaluation of the siglos would disappear. We know some gold-silver rates from Greece. In the sixth century it probably was 15:1. C. 440 it was in Athens 14:1, the same in 434, but c. 414 it was 10:1, as in 408 [44]. Afterwards, in the fourth century the gold price climbed again to 12:1, and there it remained till it sank again to 10:1 in the second half of the fourth century [45]. The sharp fall before 414 is related to the closing down of the Laurian mines, when Sparta had occupied Attica during the second part of the Peloponnesian War and the mining slaves were able to run away. This made silver scarce, while on the other hand the enormous influx of darics as bribery to the enemies of Athens made gold cheap [46]. Between 412 and 405 5000 talents were given away, or 15 million darics, if we take it that gold talents of 3000 darics were meant.

It is of some moment to determine when exactly the gold-silver rate arrived at the critical point of 13 1/3:1. It may have been in 425, shortly after the beginning of the Peloponnesian war.

To sum up: we might call the shortlived system of Alyattes, with its three coins of intrinsic value, trimetallism. The system of Croesus and the Persians is bimetallic in principle. Now bimetallism looks quite logical. One likes to have one's gold and silver coins in a certain fixed relation to each other. But it does not work. In modern times in Europe most states have striven to attain it. England was the first to see its disadvantages clearly. It abandoned bimetallism for a gold standard as early as in the seventeenth century. The last and best known example of bimetallism is France in the nineteenth century. In 1803 the rate of gold and silver was legally fixed at 15 $^1/_2$:1. Afterwards the market rate of gold rose to 15.65 and higher. Now every dealer in gold and silver brought his gold to London, where he received 15.65 units of silver, and his silver to Paris, where he paid only 15.5 units or silver for gold. France lost all its gold, but after 1850 the gold price fell, and now the reverse started to happen. French silver was exported to India till in 1872 silver became cheaper again. In the end it even reached the rate of 1:22 [47].

We can now explain why Greeks or Persians struck coins of more than local importance. In Persia the same thing happened, but Persia was able to maintain the fiction of bimetallism longer, because it controlled most sources of gold and silver in the known world [48]. There were three

exceptions: Scythia with its gold supply from the Ural, the Thraco-Macedonian region with its gold and silver mines, and the silver mines of Attica. After Cambyses had conquered Egypt and had tried to reach the Nubian gold mines, his successor Darius conquered Thrace, organized an unsuccessful expedition to the Scythian lands, and directed an equally unsuccessful expedition to Attica. The Persian failure to become master of all the gold and silver in the world had grave consequences. Of course the annual tribute of bar gold and silver was enormous. Herodotus tells us that this gold and silver was melted down in vases, and that the king struck money from this store as much as he needed [49]. According to the *Economics* of Ps.Aristotle it was the principal concern of the royal monetary policy to decide whether the king should strike gold or silver, and also whether he should make his payments in coins or in kind [50]. In the beginning he must have struck large quantities of overrated silver. Payments in Persepolis during the first half of the fifth century were made in weighed silver (not coins), or in kind, never in gold [51]. At the same time there was a big demand for gold for export. This situation changed after 425. It then became less attractive to mint silver coins which were no longer overvalued, while at the same time gold was flowing back to Persia. So after 425 the royal mint must have issued small quantities only. This resulted in a definite scarcity of coinage [52], which stimulated the issues of local authorities.

In the first half of the sixth century there was in Greece some very rare silver coinage of local importance. Only Aegina struck its "turtles" already in appreciable quantities. In the second half of the century, however, we meet with a sudden outburst of silver coinage, with centres in the mining district of the Thraco-Macedonian region, Aegina (mines of Siphnos), and of course Athens with its "owls". These coins were struck of pure silver, and, as the hoards show, many were exported to Persia. Persian gold came in return, and most of the gold treasure of the Parthenon must have been gathered in exchange for Athenian silver. If we take that, in the sixth century in Greece, the gold-silver rate was 15:1, we can understand why. One went with 13 $1/3$ units of silver to Persia, exchanged them against 1 unit of gold, brought this gold back to Greece, and received for it 15 units of silver.

Greek silver was exported in the form of coins throughout the Empire as far as Afghanistan, as hoards show [53]. These hoards have a mixed composition, even fourth century hoards still contain many sixth century coins, while together with the coins so-called "Hacksilber" is found, broken pieces of silver and of coins. Moreover it is a peculiarity of

Eastern and especially Egyptian finds that the majority of the coins are chisel-cut as a means of detecting plated specimens [54]. Athenian coins, although, as recent investigation has shown, their reputation for pure silver was well deserved [55], did not always escape this deformation [56]. This proves that Greek silver was treated as bullion. Coinage was a way of exporting Greek silver; here the stamp may be regarded as a kind of trade mark for a high quality export product.

By the steady influx of Persian gold the gold price in Greece gradually fell, till about 425 it crashed through the 13 $^1/_3$ line. Now of course the reverse situation arose. The Persian rate was once again above the market rate and the daric became overvalued.

It now became advantageous for those states outside the Empire that had an independent supply of gold, to strike gold coins in rivalry with the overvalued daric. So from 415 till the second half of the fourth century we meet the following gold coinages: Thraco-Macedonian mining district: Ainos, Maroneia and especially Thasos [57]; in the northern Black Sea region (gold from the Ural): Panticapaeum, and in the Propontis region, on the trading route from the Black Sea to Greece: Cius and especially Lampsacus [58]. The last city struck exceedingly beautiful coins with yearly changing types, like Cyzicus and Phocaea-Mytilene in electrum. Nearby Abydos struck gold probably from its own gold mines. Other states, like Athens, Corinth, Thebes, the Chalcidian League, were now tempted to strike special gold issues in time of war. That of Athens is best known, she struck gold coins in 407-6 from gold from the melted-down statues of Nike in the Parthenon, to pay for a new fleet after her great naval disasters. These coins were issued at the rate of 12:1, whereas the bullion rate at the time was 10 : 1 [59].

On the other side of the Aegean minting of silver now became profitable. In the last quarter of the fifth century we meet a sudden outburst of silver coinage here. Also many non-Greek states and rulers started a coinage of their own. Many coins were made in imitation of Greek, especially Athenian, types. After 425 the coinage of Phoenicia grows abundant [60]. Cilicia was very rich in silver [61], so it is not surprising to see that many satraps as soon as they came to Cilicia for purposes of war, started an abundant silver coinage, like Tiribazus, Datames, Pharnabazos, and lastly Mazaeus [62]. Now one could buy cheap silver in Persia, at the rate of 13 $^1/_3$ : 1, and strike one's own silver coinage at the rate of 10-12:1, or pay Greek soldiers with it who were used to such a rate. This was a blow especially to Athens, and I think the Athenian currency decree, which tried to secure a monopoly for Athenian coinage, must be

connected with the rise of silver prices inside the Athenian Empire, which made Persian silver cheaper than Attic silver [63].

We can trace the progress of coinage in the Persian Empire in written sources also. In the Aramaic papyri of the Jewish colony in Elephantine in Egypt mention of "staters" is made for the first time in documents dated c. 410 and 400. Before that payments were made in metal by weight [64]. The same happened in Persepolis [65].

The rôle which electrum played in all this is far from clear, partly owing to the fact that we do not know how electrum coins were tariffed. Theoretically we could say that the Phocaic standard of 16.4 gm and less, on which the principal electrum coins, the hektai and staters of Cyzicus and hektai of Phocaea and Mytilene, were struck, seems to be twice the gold standard used for the coins of Croesus and the Achaemenids. If we again regard this electrum as "half gold" we could take the Phocaic stater as being of the same worth as the daric. And indeed the Cyzicene stater was regarded as the equivalent of the daric in the time of Xenophon's Anabasis, c. 400 [66].

In the latest issue of *L'Antiquité Classique*, Bogaert has tried to prove that on the contrary the Cyzicene stater could not have been equal to the daric in the time of Xenophon [67]. As part of his argument to determine the rate of the Cyzicene, he supposes that some pieces must have 58 %— 59 % gold. This gives 9.28 gm gold, which is more gold than the daric of 8.35 gm itself possesses, so the Cyzicene stater must have been worth more than the daric. But this is simply not true. Cyzicenes of more than 50 % gold according to the SG method are exceedingly rare, and the copper percentage may be safely disregarded, as Dr. Das shows in this Jaarboek. Bogaert's other argument, that the pay offered by Seuthes to Xenophon's soldiers is called a "big salary", while the daric offered by the Spartans is only called a "salary" is equally unconvincing. Xenophon says [68] that, in their present unhappy circumstances one Cyzicene per month is a generous sum, the protection offered by the cavalry of Seuthes itself would be sufficient reason to be grateful. In fact, nothing in the chapters V and VI suggests that the salary offered by Seuthes is unusual. If that had been so, Xenophon would have made it the principal point of his defence. As far as I can see, the most attractive theory seems to suppose that from the beginning to the end the value of the Cyzicene was coupled to the daric. It would explain its popularity as an internationally accepted trade coin, especially in the Black Sea Region [69]. One knew that, at least at Cyzicus itself, a Cyzicene was always interchangeable against a daric.

On the other hand many early Cyzicene coins and all coins of Phocaea-Mytilene were struck as *hektai*. If again we assume an original rate of Au:Ar=12:1, or El:Ar=6:1; this would mean that one *hekte*, or sixth stater, was exactly one silver stater [70]. The coins of Mytilene and, in the fourth century, of Phocaea were issued officially with a percentage of c. 33 % gold [71]. This made them overvalued from the beginning at the rate of Au:El=2:1. But if they stayed fixed to the gold price, their overvaluation must have increased abroad after 425.

We must now ask the hoards to prove the above assertions. Gold (i) and mixed Greek silver (ii) being treated as bullion, one should expect to find them in hoards over the whole of the ancient world, but darics in Greece proper mostly after 415. If electrum, sigloi and croeseids and local silver were token money, we can expect hoards of electrum only (iii) sigloi and croeseids only (iv) of local silver only (v), also some hoards with a mixture of these classes. But the local silver, to be fiduciary, should be found at the place of issue (vi). We must not expect bullion money and token money together, as e.g. electrum and mixed Greek silver or gold, or if we meet it, we must decide if the bullion money could not have become fiduciary — as with hoards of Cyzicene staters with darics after 415 — (vii) or the other way round, if the token money could not have lost its fiduciary character, as is the case in the hoards of miscellaneous silver.

(i) *Gold only.*

Noe [72] 927 Sardis: 30 Croeseids (light, in fine style) buried in 546;
Noe 365, Egypt: 5 + Croeseids (light);
Noe 137, Benares: 172 darics;
Noe 819, Pirlibej, Asia Minor: 1000 + darics;
Noe 54, Antioch, Syria: 3000 darics;
Noe 100, Athens: 110 + darics;
Noe 586, Kutais, E. Coast Black Sea: 21 + Panticapaeum;
Noe 540, Kavalla, Macedonia (=Neapolis): Neapolis gold;
Noe 398, Eretria: 36 darics, 10 Philippi, 2 Philip II —.

(ii) *Greek miscellaneous silver.* These hoards were extensively treated by Schlumberger. The Kabul hoard is representative for hoards of the beginning of the fourth century: 4 Aegina (2 sixth century!), 1 Melos, 1 Corcyra, 2 Akanthos (1 sixth century), 1 Thasos (sixth century), 1 Lampsacos, 1 Erythrae, 1 Chios (sixth century), 1 Samos, 1 Knidos,

3 Lycia, 5 Cilicia, 3 Cyprus, 34 Athens and imitations, 8 sigloi, 14 Indian punch bars, 29 miscellaneous indigenous types, 12 pieces of "hacksilber".

A hoard of c. 480 found near Cilicia was recently published by Robinson: 1 Zankle, 1 Akanthos, 1 Abdera, 18 Athens, 9 Aegina, one Cretan imitation of Aegina, 1 Corinth, 1 Parion, 1 Chios, 1 Caria uncertain, 1 siglos. Most coins were chisel-cut, as also the one siglos, but only two of the Athenean coins [73]. A similar hoard from Egypt of the same period: 1 Abdera, 2 Thasos, 2 Akanthos, 1 Neapolis, 1 Orescii, 1 Terone, 6 "Lete", 1 Eretria, 4 Athens, 1 Aegina, 1 Naxos, 2 Chios, 1 Phaselis, 1 Idalium, 4 uncertain [74].

iii) *Electrum hoards.*

Noe 389, Ephesus: 93 El. Lydia and others with pieces of silver, basis deposit of c. 600; also a pot hoard, before the building of the temple, with uncertain electrum [75];

Noe 893, Salonica, Macedonia: 12 of Asia Minor? or Macedonia;
Noe 85, Asia Minor: 8 + miscellaneous Ionian;
Noe 902, Samos: 34 archaic Samos;
Noe 171, Bulgaria: 7 + Cyzicus;
Noe 171, Bugaria: 7 + Cyzicus;
Noe 552, Kertch, Crimea: "richest hoard", Cyzicus;
Noe 817, Piraeus: 80 Cyzicus;
Noe 248, Chios: 50 Phocaea — Mytilene.

(iva) *Croeseids and sigloi only:* Tchal near Smyrna, 432 + Croesus half staters, 1045 + sigloi; Smyrna, 1 Croesus half stater, 255 sigloi [76].

ivb) *Sigloi only:* Noe 84, Asia Minor: 4;
Noe 493, Ionia: 55 +;
Noe 695, Miletopolis (?) Mysia: 8 +;
Persia?: 10 + [77].

v) *Local silver only.* E.g. the hoards found at Chios:
Noe 244, 59 Ar, fifth century;
Noe 245, 50 Ar;
Noe 247, 9 + Ar;
Noe 249, 26 + Ar, all found at Chios, and cf. with this the mixed composition of Noe 240 dated 334-2.

via) *Local silver and gold.* No hoards of this class have come to my knowledge, *Schlumberger* 11 is a bullion hoard.

(vib) *Local silver and electrum.*

Noe 403, Erythrae: 90 early Ionian electrum, with silver from Chios, Erythrae and Clazomenae;

Noe 1167, Clazomenae: Ionian revolt electrum, with silver from Clazomenae;

Noe 241, Chios: 9 electrum of Cyzicus with 4 silver of Chios;

Noe 287, Cuzgun, Bulgaria, 2000 silver of the Black Sea Coast, 7 El Cyzicus (early fourth century).

(vii) *Gold and electrum.*

Noe 255, Clazomenae (?): 20 electrum Lampsacus, 70 electrum Cyzicus, 1 daric (dated after 412);

Noe 483, Elis: 1 Cyzicus electrum (Herakliskos-and-serpent type, fourth century), 11 darics;

Noe 841, Prinkipo (near Constantinople): 160 El. of Cyzicus, 3 gold of Lampsacus, 16 gold of Panticapaeum, 27 Philip II (end fourth century);

Noe 1041, Taman, Russia: 17 Panticapaeum, 4 Cyzicus (fourth century). To these hoards we can add the fortune of Lysias' father, who in 404 in Athens possessed 400 Cyzicene staters and 100 darics [78]. From these hoards must be excluded the following: Noe 649, Marathon: 1 Croeseid, 4 darics (dated 490); Noe 748, Nymphi (?) near Smyrna: 1 Lydian el. hekte, 1 trite, and 2 silver sigloi, 3 obols, 3 tetrobols of Croesus; Noe 922, Sardis: 11 silver croeseid staters, 5 half staters; Noe 923, Sardis: 145 Persian sigloi, 33 croeseid silver staters and half staters; Noe 924, Sardis: 1 Lydian el. 3 croeseid gold hektai, 10 silver staters and ½ stater. All these hoards were published by Lenormant only and have for that reason been suspected as forgeries by Schlumberger [79]. It appears now that Noe 924 and 748 are indeed impossible.

The hoards make some certain conclusions possible. The first and most important is that silver sigloi and Croeseids must have been overvalued in the Smyrna region, as has been said above. On the other hand in the Anatolian hoard published by Robinson, dated c. 480 and found near Cilicia, there was one siglos with a chisel-cut. Here the siglos clearly was treated as bullion, as is the case also in the enormous hoard of miscellaneous silver Noe 189, Calymna, Caria: several thousands of sigloi, on some 10000 mixed Greek coins of Rhodes Knidos, Kos, satraps of Caria, and of Cyprus. The hoard was buried c. 339; cf Noe 252, Cilicia; 49 sigloi, most of which were hacked and countermarked together with

miscellaneous silver from Athens, Syracuse etc and many Cilician issues.

Caria and Cilicia may have been always outside the siglos region. Thus the fact that here the sigloi were treated as bullion does not prove they were so treated in Ionia in the fourth century. But it is difficult to see how so many sigloi could have been exported if they were still overvalued in Ionia. I take it therefore that this and other fourth-century hoards, like for instance the bullion hoard from Babylon dated c. 385: miscellaneous silver coins, 5 sigloi with cuts, and pieces of silver [80], prove that after 425 the siglos lost its fiduciary character.

Unfortunately sigloi hoards are difficult to date. The two hoards with their large admixture of Croeseids and light sigloi may be early; hoards like Noe 993, Smyrna: 419 Ar, sigloi mainly, many with small countermarks and hammered flat, along with four in halves, must be fourth-century.

The behaviour of electrum is more difficult to determine. The hoards certainly show a very homogeneous composition. One finds early Ionian, early Samian etc. together. But this uniform composition may be due to local circulation. Only Cyzicus electrum seems to have travelled far [81].

The hoards with mixed silver and electrum have local silver only. Hoards like Noe 1167: Clazomenae with local silver and international Ionian revolt electrum, Noe 241: local Chios with Cyzicus electrum, must be typical. The same phenomenon occurs with local silver and sigloi, as found in the Bairakli (Smyrna) hoard: 2 silver Croeseids and four sigloi, found together with 14 silver coins of Phocaic type, but probably of Smyrna [82]. As the sigloi and croeseids were certainly overvalued at the time, the local silver coins must have been so too. This also proves that the electrum of Cyzicus and Phocaea-Mytilene was overvalued already in the last part of the sixth century. Cyzicene electrum seems to mix with gold after 412. Probably Cyzicene electrum staters and Lampsacene etc. gold staters were all coupled to the daric.

This article was originally meant to be nothing but an amplified version of the comments I made on the first showcase in a Guide to the Exhibition of Persian Coins, held at the Royal Coin Cabinet at the Hague in the autumn of 1962. As I tried to combine the different views of Bolin on the original character of Lydian electrum, of Jongkees and Robinson on Croeseid and early Achaemenid coinage, and of Schlumberger on the rôle of Greek silver in the Persian Empire, I soon saw that it was impossible to make them agree and that especially the gold and silver coinage attributed to Croesus formed the stumbling block. Out of all that grew,

quite unexpectedly and hurriedly, this new theory. Part of it must be true as it stands, most of it wants further elaboration. Especially the rôle of electrum is far from clear. In the future I hope to work out a study of electrum based on its metallic content. Provisionally this article may serve as a frame for further thinking.

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[19] Reinach, p. 46—8.
[20] Bolin, p. 36.

[21] Hultsch, p. 181, n. 5.
[22] Bolin, p. 24.
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[42] Forbes, p. 188—91.
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[59] Ferguson, p. 87, n.2; E. S. G. Robinson, Some Problems in the Later Fifth Century Coinage of Athens, *ANSMN* 1960, p. 10.
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[66] Xen. *An.* VII, 2,31; V, 6, 23; Heichelheim, *PW*, art. Monopole (1933), p. 153.
[67] R. Bogaert, Le Cours du Statère de Cyzique, *L'Antiquité Classique* 1963, p. 91—2.

[68] Xen. *An.* VII, 6,30:

*Εἰ δὲ δὴ ὁ συμπαρέχων ὑμῖν ταύτην τὴν ἀσφάλειαν μὴ πάνυ πολὺν μισθὸν προσετέλει τῆς ἀσφαλείας, τοῦτο δὴ τὸ σχέτλιον πάθημα καὶ διὰ τοῦτο οὐδαμῇ οἴεσθε χρῆναι ζῶντα ἐμὲ ἀνεῖναι;*

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[71] J. Hammer, Der Feingehalt der griechischen und römischen Münzen, *ZfNum,* 1908, p. 41—47; the copper percentage may be disregarded, see this *Jaarboek* p. 65.

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[80] E. S. G. Robinson, A "Silversmith Hoard" from Mesopotamia, *Iraq* 1950, p. 44 ff.

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