

# **Weighing or counting in ancient Greece: the first coins.**

By Gilles Bransbourg

Working version – not to be disseminated

## ***Introduction***

Human societies have used a wide range of material and immaterial objects as currencies. These units of account had to respect several conditions: to be storable, divisible, standardized, relatively difficult to counterfeit, to have sufficient but not excessive supply, and to be socially accepted. This includes the role played by state authorities, although they were not necessarily the entities producing these currencies.

Cowries, which circulated across the Indian Ocean world, from eastern Africa to southern China, satisfied all these conditions. A range of crypto currencies qualify today. Coined metal has fulfilled all these functions as well for more than two thousand years, in the Mediterranean and Near Eastern traditions (often characterized as ‘Western’ providing the West includes the Near East) as well as in China and the Indian subcontinent. Their value derived both from their metallic composition, and from their recognized status as legal standard. Traditionally, gold was traded at full commodity value, while copper and bronze tended to be fiduciary, with silver often occupying an intermediate position. This said, the conditions surrounding the birth of coinage in the Western world remain shrouded in mystery.

Lydia, a prosperous kingdom located in western Asia Minor, began to produce stamped and standardized pieces of electrum (a controlled alloy of gold and silver) in the late seventh century BCE, soon followed by a handful of Greek polities in the Aegean region. Even though the reasons why Lydia chose electrum remain a matter of debate, there are reasonable assumptions that earning seignorage thanks to a limited debasement of its standard gold-silver mix played a role. Lydia then shifted to producing gold and silver coins, a practice upheld by the Achaemenid Empire after its conquest of Lydia in the mid-sixth century. At the same time, silver coinage spread rapidly throughout the Greek world, with over a hundred city-states minting coins by the turn of the sixth and fifth centuries.

However, the Levant, Mesopotamia and many other advanced regions of the ancient world did not follow until much later. The Achaemenids, who ruled over their vast empire stretching from Egypt to India, essentially minted coins only for their dealings with the Greek world, and most of these coins have been retrieved in their western provinces or in Greek territories. They did not spread to the central and eastern provinces in any significant degree. And when they did, they were weighed and not counted.

The very economically advanced societies in Mesopotamia, Egypt and the Levant, had already used weighed gold, silver and copper, alongside other staples like barley or wool, for a few thousand years when coinage appeared. By the turn of the first millennium BCE, silver imposed itself as the most important monetary medium. Surviving records and statements document how users dealt with weighed silver, while archaeology testifies to the spread of cut silver, Hacksilber, across the Near East and Egypt. But the region did not adopt the practice of stamping standardized silver objects like the Greek world did, at least not quickly by historical standards. Economic historians have struggled to determine what had rendered the 'Greek mind' different. Were Greeks more advanced, freer, or more entrepreneurial? Or did earning seigniorage or displaying civic pride explain the spread of coinage?

We don't believe that any of these conditions explain the peculiarity of the Greek adoption of coinage. Greeks were not economically more advanced than their eastern and southern neighbors, and it is unlikely that producing silver coins brought significant profits to the local treasuries. As far as pride is concerned, many cities did not strike at all or did so with irregularity. Similarly, no one can deny the entrepreneurial spirit of the Phoenician seafarers. The question remains largely unsolved.

### ***Coinage and Greece***

Why coinage appeared in the Mediterranean and Near East represents one of the most researched topics in economic history, as well as one of the most frustrating. As Sita von Reden could write back in 1997, "The great number of possible explanations, none of which are wholly satisfactory, has made scholars abandon the question of the primary function of the first coinages. This may best be illustrated by the most recent textbook that simply states that we know nothing of the function of the earliest coinage."<sup>1</sup> More recently, it has been argued that the 'when', 'where', 'why' and the 'how' have become secondary (albeit interesting) questions, and that we should rather reflect on 'what' coinage is.<sup>2</sup> This statement suggests that we should no longer pursue an explanation for the origin of coinage, as the findings inevitably fail to convince.

Obviously, money predates the invention of coinage. The monetary use of weighed metal in the ancient Mediterranean/Near Eastern world - gold, silver, copper - is attested since the third millennium BCE in Mesopotamia, while the first coins are commonly dated to the late seventh century BCE in Lydia in western Asia Minor. However, historians are not dealing with a simple narrative of a continuous progression. The practice of using coins by tale did not quickly spread north, south, west, and east, advantageously replacing the process of weighing pieces of metal in offering a reduction in transaction costs, an easier medium to

---

<sup>1</sup> von Reden, "Money, Law and Exchange," 156.

<sup>2</sup> Hochard, "L'apparition de la monnaie frappée," 30.

pay armies, seigniorage benefits, coupled with opportunities for political messages and/or the expression of civic or royal pride.

The actual historical developments are more complex and puzzling. The Greek cities quickly adopted coinage during the second half of the sixth century BCE, to such an extent that by the turn from the sixth to the fifth centuries, some 100 mints were active.<sup>3</sup> However, the more economically advanced polities of Mesopotamia, Egypt and Phoenicia waited almost two centuries until they locally minted coins, and even then some key regions like Babylonia primarily stuck to their traditional practice of weighing metal (coins included) rather than using denominated coins by tale for transactions, even after Alexander's conquest.<sup>4</sup>

That early classical Greece, a relatively backwater region, became the seat of an efflorescence of many different types of coinages, displacing previous forms of metallic wealth, remains paradoxical. After all, the great merchant states of Sidon, Byblos, Arwad, Tyre and Carthage managed much more complex and longer-distance trade networks and exchanges than the Greeks of the period.<sup>5</sup>

### **Why Greece?**

A wide range of explanations for the spread of coinage in Greece has been suggested. The most traditional view links the use of coined metal with the development of trade, advantageously replacing weighed commodities.<sup>6</sup> This concept derives from the Greeks themselves. Herodotus (1, 94, 1) seems to link the early minting of coinage with retail trade; Plato (*Rep.* 2, 371) defines money as a symbol produced to facilitate trade; Aristotle (*Pol.* 1, 9, 7-8) attributes the invention of coinage to the necessity of exchanging goods, which is reformulated several centuries later by the Roman juriscult Paulus (*Dig.* 18, 1, 1). However, Greece itself was economically less advanced than the more ancient civilizations thriving to the south and east, where long-distance and local trade had existed and developed for a longer period. Phoenicia was filled with proud merchant city-states located at the head of a trading network extending to Carthage and its own colonies. And these polities waited about a century and a half to emulate the Greek coinage practice.

As purely economic considerations fail to convince, more anthropological explanations are posited by modern scholars. Coins would have allowed the Greek polities to display civic pride.<sup>7</sup> Coins would fit the specific needs of the city-states of Greece, which lacked a central authority, and needed a medium through which wealthy citizens could fulfill their economic obligations.<sup>8</sup> The advent of coinage has been linked to the development of

---

<sup>3</sup> Kim, "Archaic Coinage", 10 and map 1.1.

<sup>4</sup> Vargyas, "Silver and Money," 516-17.

<sup>5</sup> Pappa, *Phoenicians*.

<sup>6</sup> Smith, Adam. *Wealth of Nations*, book 1, chapter 4.

<sup>7</sup> Finley, *The Ancient Economy*, 166, partially inspired by Keynes, *A Treatise on Money*, 10-11.

<sup>8</sup> Martin, "Why Did the Greek 'Polis'?"

formal social structures and the implementation of legal frameworks in these emerging civic communities.<sup>9</sup> At the same time, coins would represent a superior medium for the settlement of standardized state and military expenditures.<sup>10</sup> The tributary nature of the eastern Empire, requiring forced labor and commodities from their subjects, has been compared to the legal equality enjoyed by the Greek citizens in democratic states.<sup>11</sup>

Historically, coinage would have emerged as Greek polities experienced major social upheavals, evolving from monarchical and landed aristocratic regimes into populist tyrannies and then democracies. Civic values and the generalisation of trade would both conflict and converge through the use of coinage.<sup>12</sup> It came to represent an essential tool allowing democracies to function, including impersonal circulation of wealth and redistribution, which would challenge the traditional aristocratic monopoly of precious metals.<sup>13</sup> These upheavals would have made the fragmented Greek city-states more receptive to innovation.<sup>14</sup>

A broad line of argument that incorporates economic considerations has been presented by Christopher Howgego, who links coinage to the growth of state authority and rule of law in the Greek polis, while acknowledging the role of increasing market exchange.<sup>15</sup> The return to a more economic line of explanation is now supported by the number of very small silver fractions discovered thanks to more recent archaeological excavations. It contradicts the original belief that Greek cities did not use coins for local low-value transactions.<sup>16</sup>

At the same time, Greek culture would have distinguished itself by sacrificial distribution, which rendered it more open to the concept of fiduciary goods, allowing the state to issue fiduciary pieces of metal carrying a socially conferred value.<sup>17</sup> Effectively, the fiscal profits brought by minting fiduciary coins, whose official values exceeded their commodity values, would have represented another stimulus for the Greek cities, deprived of the massive land income enjoyed by Mesopotamian states.<sup>18</sup>

None of this applies, however, exclusively to Greece. As previously noticed, Phoenicia shared many of its social and political structures with Greece, while being generally economically more advanced. Stating that the 'Phoenicians missed the boat,' as Schaps puts it, does not explain why it would have taken them so long before understanding the

---

<sup>9</sup> Austin and Vidal-Naquet, *Economic and Social History*, 56-58. The authors agree as well with the concept of civic pride and symbol of its independence as a state.

<sup>10</sup> Cooke, "Origins of Coinage", Kraay, *Greek Coins*, 317-328.

<sup>11</sup> Bresson, *Ancient Greek Economy*, 265-271.

<sup>12</sup> von Reden, "Money, Law and Exchange".

<sup>13</sup> Kurke, "Herodotus," 42.

<sup>14</sup> Schaps, "War and Peace".

<sup>15</sup> Howgego, *Ancient History*, 14-18.

<sup>16</sup> Kim, "Archaic Coinage," 12-13.

<sup>17</sup> Seaford, *Money*, 136-146.

<sup>18</sup> Le Rider, *Naissance de la monnaie*, 82-83.

upside offered by coinage if it had been that obvious. Interestingly, Schaps also concedes 'there was nothing that could be done with coins that could not be done with bullion'<sup>19</sup> Moreover, striking coins is an enterprise that requires the organized acquisition and refining of metal, the regular engraving of dies, the production of standardized flans, issuing multiple denominations in sufficient numbers, and releasing them into circulation. Then the authorities need to ensure that the coins in the circulation pool respect defined weight standards within acceptable limits, implying the frequent need to melt down worn pieces in order to strike new. What then would have been the whole point of dedicating so many resources to the production of coins?

### ***Weighing and counting***

Mutual trust lies at the heart of money. Any monetary medium needs social acceptance to function. The key question in that context is to determine what historical circumstances contributed to these fundamental differences in monetary practices between the Near East and Greece. Why should some societies privilege weighing precious metal, while others would rather count standardized and stamped fragments of the same metals?

Mesopotamia in the early third millennium BCE did not use a single monetary medium as part of its exchange activities and accounting processes. The region evolved toward the use of 'potentially useful substances' rather than 'symbolic monies'. Barley, lead, copper, tin, silver and gold functioned as money, occasionally supplemented by other exchangeable goods like cattle. (M. Powell, 'Money in Mesopotamia', *Journal of the Economic and Social History of the Orient*, 39, 1996, p. 224-242, see notably p. 227-228). Among these mediums, barley and silver dominated, the latter replacing copper as monetary metal by default around the middle of the third millennium, while some occasional periods witnessed a major role for gold (V. Bartash, *Establishing Value. Weight Measures in Early Mesopotamia*, 2019, p. 173-183; K. Kleber, 'The Kassite Gold and the Post-Kassite Silver Standards Revisited', in K. Kleber and R. Pirngruber (eds.), *Silver, Money and Credit. A tribute to Robertus J. Van der Spek on the occasion of his 65th birthday*, 2016, p. 39-60, notably p. 42-43 for gold). From a metallurgical point of view, reaching high levels of silver purity through cupellation was achieved in the fourth millennium (B. Helwing, 'Silver in the early societies of Greater Mesopotamia, in H. Meller, R. Risch, and E. Pernicka (eds.), *Metalle der Macht – Frühes Gold und Silber. 6. Mitteldeutscher Archäologentag. Internationale Tagung*. Halle: Sachsen-Anhalt Landesmuseum für Vorgeschichte, 2014, p.411-421). As Mesopotamia was devoid of silver resources, the palace and temples of Ur sent merchants carrying wool, fish, leather items, wheat, dates, and base metals to acquire precious metals (A. Khounani, *Silver Drachms and Bronze Drachms: Currency Reforms of the Achaemenid Empire (247 BCE–224 CE)*; D.Phil. dissertation, Institute for the Study of the Ancient World, New York University, 2024, p. 54-55).

---

<sup>19</sup> Schaps, 'War and Peace,' 46.

Ongoing conversations in the Polanyan tradition about the very nature of money, the difference between barter and monetary exchange, token and commodity values, the role of silver as a standard of value and store of wealth rather than as a multi-purpose physical monetary object, have and will continue to take place (e.g., E. D. Heymans, *The Origins of Money in the Iron Age Mediterranean World*, Cambridge, 2021, p. 17-54; M. Powell, 'Ancient Mesopotamian Weight Metrology: Methods, Problems and Perspectives', in M. Powell and R. H. Sack (eds.), *Studies in Honour of Tom B. Jones, Alter Orient und Altes Testament* 203, 1979, p. 71-109; Seaford, *op. cit.*, p. 318-333). When used for transactions, the purchasing value of silver would have been too high for day-to-day acquisitions or exchanges in the third millennium, inaccuracies in weighing would have added yet another hurdle, and a lack of metal fineness specifications would further prove that silver was not exchanged – hence the monetary role of barley. David Graeber went as far as stating that “for one thing, silver did not circulate very much” (David Graeber, *Debt. The first 5,000 years*, Brooklyn, London, 2014 (2011), p. 39. As a result, the ubiquitous presence of silver in early Mesopotamian accounts would mean that silver was normally used to regulate barter rather than be physically exchanged, while credit allowed for the coincidence of wants via deferred transactions (A. L. Oppenheim, *Ancient Mesopotamia. Portrait of a Dead Civilization*, University of Chicago Press, Chicago, 1977 (1964), p. 83-94; J. Renger, 'Subsistenzproduktion und redistributive Palastwirtschaft: Wo bleibt die Nische für das Geld?', in W. Schelkle and M. Nitsch Rätzel (eds.), *Geld: Annäherungen aus ökonomischer, soziologischer und historischer Sicht*, Marburg, Metropolis-Verlag, 1995, p. 271-323). Such an explicitly abstract transaction is preserved in Egypt under the reign of Ramses II by *P. Cair. 65739*, documenting the price of a Syrian girl against various items – linen, bronze jar, shirts, raw bronze, all items valued in units of silver until the exchange is balanced, with no physical silver involved (A. Gardiner, 'A Lawsuit Arising from the Purchase of Two Slaves', *The Journal of Egyptian Archaeology* 21, 1935, p. 140–6).

At the same time, ancient texts and archaeological finds provide joint evidence about silver rings, coils, scrap pieces and ingots that followed specific weight standards since the third millennium (M. Powell, 'A Contribution to the History of Money in Mesopotamia prior to the Invention of Coinage', in B. Hruška and G. Komoroczy (eds.), *Festschrift Lubor Matouš*, vol 2, Okori Torténeti Tanszekek, 1978, p. 211–243; M. Stol, *Women in the Ancient Near East*, H. and M. Richardson (trans.), 2016, De Gruyter, Boston/Berlin, p. 34-36). In Mari, actual transactions document refined silver (*kaspum sarpum*) changing hands physically, including for private transactions and tax payments (J.-R. Kupper, 'L'usage de l'argent à Mari', in Zikir Šumim. *Assyriological studies presented to F.R. Kraus on the occasion of his seventieth birthday*, Studia Francisci Scholten Memoriae Dicata 5, G. van Driel, Th. J. H. Krispijn, M. Stol, and K. R. Veenhof (eds.), Brill, Leiden, 1982, p. 163-172). In fact, silver could be used simultaneously as a means of payment and standard of value (X. Ouyang, *Monetary Role of Silver and its Administration in Mesopotamia during the Ur III Period (c. 2112-2004 BCE). A Case Study of the Umma Province*, Madrid, 2013, p. 97-98). Temples, institutions, and merchants went to great lengths to acquire and store silver from very distant locations, and it would have made little sense that such physical stocks were never used to settle some of the numerous actual transactions that have been archaeologically

preserved. Silver most likely served several functions simultaneously: a store of value, a medium of exchange, a unit of account, and a symbol of social prestige.

By the early second millennium, the Old Assyrian caravans clay tablets from Kanesh in Anatolia, dating from *ca.* 1920-1840 BCE, demonstrate unambiguously that quantities of physical silver (*kù babbar*) as well as gold of different fineness (*guškin* at a 8.25 silver value ratio, *guškin kubursinnu* at a 6.67 ratio in the same tablet; prices of 7.33 and 8.83 shekels of silver per shekel of standard gold are attested in other transactions), often sealed, were imported from Anatolia. They served as a medium for physical transactions involving merchants from southern Mesopotamia and Iran bringing tin, copper, and textiles (M. Larsen, *Old Assyrian Caravan Procedures*, 1967, notably p. 98, 101, 105 for gold prices). The spread of weights and scales to the Aegean world and then to the western Mediterranean regions materializes how such practices expanded geographically during the Bronze Age (N. Ialongo, R. Hermann, and L. Rahmstorf, 'Bronze Age weight systems as a measure of market integration in Western Eurasia', *Proceedings of the National Academy of Sciences* 118/27, 2021, p. 1-9).

The Hittite legal corpus suggests a dual currency economy, with silver occupying the higher range for transactions and fines valued higher than half-a-shekel, while payments of lesser value involved barley. Like silver, this does not mean barley was physically exchanged each time, since both mediums could be used as standards of value for regulated barter. Silver was especially suited for infrequent high-value transactions (E. Floreano, 'The Role of Silver in the Domestic Economic System of the Hittite Empire', *Altorientalische Forschungen* 28, 2001, p. 209-235, notably p. 213-218). During the Late Bronze Age, the archives of the trading city of Ugarit in the northern Levant preserved multiple instances of the monetary use of precious metals, mostly silver, alongside other commodities and good like textiles, grain, oil and copper. Standardized copper ingots with a high level of porosity were likely produced to facilitate their breaking down into smaller fragments for use in actual transactions (Heymans, *op. cit.*, p. 119-126). In Egypt, evidence of gold and silver being weighed as part of transactions as well as being used as units of accounts appear during the Middle Kingdom, to become prevalent with the eighteenth dynasty (E. W. Castle, 'Shipping and Trade in Ramesside Egypt', *Journal of the Economic and Social History of the Orient* 35/3, 1992, p. 239-277; Heymans, *op. cit.*, p. 131-139).

All of this contradicts a fully abstract scenario with respect to the use of silver. One might wonder why an entire school of thought seems dissatisfied whenever the evidence for the physical use of precious metals as currency is overwhelming.

Mesopotamia's monetization gradually increased, even if this is not a linear story of continuous progresses. Silver replaced copper and bronze as the preferred currency in Assyria by the end of the eighth century, while still supplemented or completed by barley, dates, and wool in some transactions (Heymans, *op. cit.*, p. 156-161; M. Jursa, *Aspects of the Economic History of Babylonia in the First Millennium BC: Economic Geography, Economic Mentalities, Agriculture, the Use of Money and the Problem of Economic Growth*,

2010, p. 474-475 and 576-611). During the Neo-Babylonian and the Achaemenid periods, silver was customarily exchanged physically during transactions and payments. (Heymans, *op. cit.*, p. 64-68; M. Jursa, *op. cit.*, p. 469-753, 772-773; M. Van De Mierop, 'Silver as a Financial Tool in Ancient Egypt and Mesopotamia', in P. Bernholz and R. Vaubel (eds.), *Explaining Monetary and Financial Innovation. A Historical Analysis*, 2014, p. 17-30; C. Thompson, 'Sealed Silver in Iron Age Cisjordan and the 'Invention' of Coinage', *Oxford Journal of Archaeology* 22, 2003, p. 67-107). A fascinating transaction describes a farmer receiving a silver ingot weighing 31 shekels and requesting that the piece be cut up and guaranteed by the buyer, a city business person. This illustrates how silver permeated the countryside and how the issue of using silver as small change was practically handled (Jursa, *op. cit.*, p. 479-480). For all purposes, weighed silver was money, and the fact it did not occupy a monopolistic position does not really matter. As put by Heymans, "...an apparent distinction between two types of money is not conducive for creating a better understanding of economic exchange and money in the historical framework addressed here." (Heymans, *op. cit.*, p. 53)

Following the birth of coinage in Lydia and the Aegean region in the later seventh century, and the conquest of Lydia by Cyrus in 547-46, gold and silver coins were regularly produced under Persian authority in Sardis. During the fifth and the fourth centuries, cities in Cyprus, then Phoenicia, Cilicia, and more generally the Levant, began to mint their own coinages. It does not seem, however, that these coins circulated much in the eastern and Mesopotamian provinces of the Persian Empire (C. Tuplin, 'The Changing Pattern of Achaemenid Persian Royal Coinage', in Bernholz and Vaubel *op. cit.*, p.127-168). When the Egyptian pharaoh Tachos raised taxes to finance his expedition to Phoenicia in 363-361 BCE, he expressed a preference for uncoined gold and silver, whereas silver coinage had nevertheless circulated and been minted in the region for several decades (P. van Alfen, 'Herodotus' "Aryandic" Silver and Bullion Use in Persian-Period Egypt', *American Journal of Numismatics* 16/17, 2004-05, p. 7-46, at p. 26).

What represents probably the most striking observation is that even after the Macedonian conquest, the establishment of a mint in Babylon itself, and the production of coins in unparallel quantities by Alexander and his successors from the late fourth century BCE onward, coins were rather weighed than counted (A. Meadows, 'The spread of coins in the Hellenistic World', in Bernholz and Vaubel *op. cit.*, p. 169-194; F. Joannès, 'Métaux précieux et moyens de paiement en Babylonie achéménide et hellénistique,' *Transeuphratène* 8, 1994, p. 137-144 ; P. Vargyas, 2000, art. cit. ; B. van der Spek, 'Money, Prices and Market in the Ancient Near East', 2015, *Yale University New Haven, Economics Department. Economic History Seminar, March 30, 2015*, [https://economics.yale.edu/sites/default/files/yale\\_money-prices-markets.pdf](https://economics.yale.edu/sites/default/files/yale_money-prices-markets.pdf)). In the Levant, both practices seem to have coexisted during the fourth century, effectively a period of transition (F. Duyrat, ' Money in Southern Transeuphratene during the Fourth Century B.C.E.', *Phoenix* 76, 2022, p. 228-249).

## ***In Silver We Trust***

The ubiquitous act of weighing silver in the Near East implies a social consensus providing silver with an accepted value. Even though it did not carry any obvious utilitarian function like grain, copper or textiles, silver, like gold, had a range of characteristics that made it desirable and carried social prestige. The ease of quantification and divisibility of silver in transactions and value assessment enabled its widespread use for scaling various exchanges of goods. As such, quantity mattered. This is why it was a criminal offense to falsify weights. This has been preserved by biblical sources (*Lev.* 19, 35-36, *Deut.* 25, 13-16) as well as the Mesopotamian legal corpus and the well-attested existence of royal standards in the second and first millennia BCE (Powell 1979, *art. cit.*, notably p. 83, n. 39 and p. 85, n. 47 and n. 48).

The proverbial 'elephant in the room,' is the question of fineness, because pure silver from mines does not exist, and the silver alloy used in Mesopotamia was typically of high quality. As highlighted, however, by Marvin Powell, 'one peculiarity about the documentary evidence from Mesopotamia monies should be noted: the general absence of specifications about quality' (Powell 1996 *art. cit.*, p. 230).

At the same time, by the early first millennium BCE at the latest, progresses achieved in the metallurgic field had allowed the production and measurements of specific alloys with a relatively high degree of accuracy. The concept of 'red gold' of high quality appears during the later third millennium BCE in Mesopotamia (H. Waetzoldt 1985 'Rotes Gold?', *Oriens Antiquus* 24, p. 1–16). Since the second millennium, *kaspum ellum* had designated purified silver in Akkadian (Bartash, *op. cit.*, p. 182-183). A fourteenth-century BCE letter from the Babylonian king Burna-buriaš II to the pharaoh Akhenaten complained about the low fineness of a delivery of gold, probably mixed with silver and copper, while fire assaying of gold is attested by an eighteenth-century BCE letter to the king of Mari (K. Kleber, 'As Skillful as Croesus. Evidence for the Parting of Gold and Silver by Cementation from Second and First Millennium Mesopotamia', in P. van Alfen and U. Wartenberg, *White Gold. Studies in early electrum coinage*, 2020, p. 17-34, at p. 5-6 and 9). During the Old Assyrian period in the early second millennium BCE, the archives from Kanesh distinguish between several qualities of silver, qualified 'fine', 'refined', and 'checked'. Silver was remelted to increase its fineness before being shipped to Assur, with losses close to 4% of the metal (R. J. van der Spek, J. G. Dercksen, K. Kleber and M. Jursa, 'Money, Silver and Trust in Mesopotamia', in *Money, Currency and Crisis. In Search of Trust, 2000 BC to AD 2000*, R. J. van der Spek and B. van Leeuwen (eds.), 2018, p. 102-131). Although an isolated find, the eighth century inscribed lentil-shaped silver discs of Barrekub in Zinçirli in north-west Syria deserve to be mentioned as well (M. S. Balmuth, 'The Critical Moment: The Transition from Currency to Coinage in the Eastern Mediterranean', *World Archaeology* 6/3, Currency, 1975, p. 293-298).

Neo-Assyrian, Neo-Babylonian and Achaemenid archives include wording pointing to the specific quality of the alloy, 1/8 of base metal, *i.e.*, 87.5% silver, representing the best-

documented alloy. Additional levels of fineness are mentioned, as high as 95.83% with 1/24 of base metal, and explicit references to the quality of silver become very frequent by the mid-sixth century (Powell 1996 art. cit. p. 231-233; P. Vargyas, 'Kaspu ginnu and the Monetary Reform of Darius I', *Zeitschrift für Assyriologie* 89, 1999, p. 247-268, see Figure 1, p. 263-266; I. dos Santos Martins, 'Metal, Object, Measure and Cash. Silver in First Millennium BCE Babylonia', *Archives in Context, a Persia and Babylonia project*, 2019 [persiababylonia.org/archives/background/metal-object-measure-and-cash-silver-in-first-millennium-bce-babylonia/](http://persiababylonia.org/archives/background/metal-object-measure-and-cash-silver-in-first-millennium-bce-babylonia/); van der Spek, Dercksen and Kleber art. cit., p. 125-126; Jursa, *op. cit.*, p. 475-479).

The parallel circulation of silver of different standards is, for instance, recorded by a promissory note in the Iššar-Taribi archive, spanning the late Neo-Babylonian/early Achaemenid period, which mentions a half-a-mina of pure silver and half-a-mina of 87.5% silver as part of the same liability (R. Pirngruber, 'Minor Archives from First-Millennium BCE Babylonia: the Archive of Iššar-Taribi from Sippar' *Journal of Cuneiform Studies* 72, 2020, p. 165-198, at p. 179-180).

A 95%-silver standard is probably expressed by the Aramaic phrase 'two quarters to the ten' in the fifth-century Elephantine papyri (P. Vargyas, 'Weight Standards and Fineness of Silver in Aramaic Documents from Elephantine', in K. D. Dobos and M. Koszeghy (eds.), *With Wisdom as a robe. Qumran and Other Jewish Studies in Honour of Ida Fröhlich*, 2009, p. 384-393). That fineness was considered in pricing precious metals is further documented by the variable gold to silver ratios recorded during the Neo-Babylonian period, and their relationships with the fineness of the gold alloy (Kleber, *art. cit.*, p. 15).

The seemingly general circulation of very fine silver alloys described by the texts are confirmed by the archaeological record. Hacksilber finds from the Levant dating from the early Iron Age, therefore predating the Neo-Babylonian/Achaemenid period, display silver fineness consistently above 95% (Thompson *art. cit.* Table 1 p. 83), while some indices of voluntary debasement seem to have taken place earlier on during the late Bronze Age to Iron Age transition, *ca.* 1200-950 BCE. This transitional period would have witnessed a partial disintegration of the trading relationships between the Levant and the sources of silver (T. Eshel, A. Gilboa, N. Yahalom-Mack, O. Tirosh, Y. Erel, 'Debasement of silver throughout the Late Bronze – Iron Age transition in the Southern Levant: Analytical and cultural implications', *Journal of Archaeological Science* 125, 2021, p. 1-24).

Analysis of Achaemenid hoards, combining struck coins and Hacksilber, provide consistent high-quality alloys of coined and uncoined silver alike - over 95% as well (J. Reade, 'A Hoard of Silver Currency from Achaemenid Babylon, with M. J. Hugues, 'Analysis of Silver and Gold Items in a Hoard Found at Babylon', *Iran* 24, 1986, p. 79-89). Interestingly, the prevalence of this level of fineness is confirmed on inscribed silver bowls from the reign of Artaxerxes I as well as a number of silver objects of uncertain provenance that belong to the same period (A. Zournatzi, 'The processing of gold and silver in the Achaemenid empire: Herodotus 3.96.2 and the archaeological realities', *Studia Iranica* 29, 2000, p. 241-271,

notably p. 251, Table I, p. 252, and Table II, p. 262). The extant material does not provide, however, any evidence for some of the other alloys mentioned by the text, including the 7/8<sup>ths</sup> pure silver that is so prevalent in the sources.

The extent of the involvement of authorities in regulating the quality of circulating silver remains poorly documented. Under Jehoash of Judah during the late eight century, silver gathered for the temple was casted and refined in order to be usable by weight (Heymans, *op. cit.*, p. 151-154; J. C. Greenfield, 'The Meaning of *TKWNH*' in A. Kort and S. Morschauser (eds.), *Biblical and related studies presented to Samuel Iwry*, Winona Lake, 1985, p. 258-262, notably n. 13, p. 260-261). This must have been a common practice in the region. During the Neo-Babylonian period, the use of term *ša šarri* (royal silver, or silver of the king) suggests some form of central control (dos Santos Martins *art. cit.*, Table IV, p. 6). The term *ginnu*, which appears in Neo-Babylonian and Achaemenid records, has been interpreted as evidence for stamped coins (Vargyas 1999 *art. cit.*). It is however best explained as a mark of guarantee (Powell 1996 *art. cit.*). Vargyas' thesis is neither supported by the chronology, since the term predates the Persian conquest (Tuplin *art. cit.*, p. 129, n. 9), nor by the metrology; many references to *ginnu* silver are associated with the alloy including 1/8 of copper, while Persian silver coins, i.e., *sigloi*, showcase fineness of at least 95% (Jursa, *op. cit.*, p. 480-485).

There may be a relationship between this mark of guarantee and the sealed bundles of cloth from the early Iron Age Israel and Palestine that contained Hacksilber of very high fineness, a practice thus attested in Mesopotamia and Egypt by textual and archaeological evidence (Thompson *art. cit.*; P. Vargyas, 'Moneybags in Neo-Babylonian texts', in Y. Sefati et al. (eds.), *An Experienced Scribe Who Neglects Nothing. Ancient Near Eastern Studies in Honor of Jacob Klein*, 2005, p. 587-599).

The use of sealed bags in dealing with silver and other valuable commodities are well attested since the second millennium (M. Silver, 'David M. Schaps, The Invention of Coinage and the Monetization of Ancient Greece. Ann Arbor: University of Michigan Press, 2004. Book Review', *Economic History Association* 2004, p. 1-17, notably p. 6-7 including primary references: [https://eh.net/book\\_reviews/the-invention-of-coinage-and-the-monetization-of-ancient-greece/](https://eh.net/book_reviews/the-invention-of-coinage-and-the-monetization-of-ancient-greece/)). The Old Assyrian archives document the existence of private seals among the merchant class. More generally, the sealing of money bags seems to have been the general prerogative of some authority, such as temples, cities and associations of merchants. Out of the twelve bags from the Larsa hoard, one was sealed by an official of the Ebabbar temple, and the others by a royal assayer in the name of the king. Similar practices are attested in Mesopotamia during the Old Babylonian period (P. Vargyas 2005, *art. cit.*, p. 208-209).

It is therefore not surprising to observe that a specific quality of silver in Neo-Babylonian and Achaemenid documents, called *ginnu* silver, involves the legal authorities. Texts from two major sanctuaries, Ebabbar of Sippar and Eanna of Uruk, state that the use of that quality of silver is regulated by the king. In one case, the letter explains that silver with the

*ginnu* quality cannot be used, and that refined silver should be used instead. The second letter, even more compelling, warns silversmiths that it is a serious crime against the king to cast objects out of that type of silver (Vargyas 1999 *art. cit.*, p. 256). This concern for fineness at the highest official level is demonstrated by a history told by Herodotus (4,166), relating the execution for treason suffered by the Persian governor of Egypt, Aryandes, in ca. 496 BCE, guilty of producing silver coins of higher quality than the king. Since there is no evidence he ever minted coins, Herodotus probably meant silver refined at a higher fineness than the royal standard (van Alfen 2004-05, *art. cit.*, p. 24-25). More evidence about official involvement with silver quality standards comes from a preserved transaction from Borsippa. Silver that comes from the *arannu* (official cashbox) is disbursed, under the control of a goldsmith and a smith, obviously there as official guarantors of the metal purity. The context makes clear that this standard was closely controlled, and could be used for private transactions. Some form of guarantee must have been visible, probably through the use of sealed bags (Jursa, *op. cit.*, p. 486-490).

The discovery of the earliest known counterfeit silver currency in a twelfth-century context at Beth Shean, a chocolate-bar type of ingot, characterized by a silver surface and a copper core, illustrates the profits that counterfeiters could achieve (A. Mazar, 'Four thousand years of history at Tel Beth-Shean, *Biblical Archaeologist* 60, 1997, p. 62-76, at p. 71).

The widespread circulation of standardized silver enjoying royal guarantee is highly consistent with the storage practice in the Persian Empire mentioned by Herodotus (3, 96, 2) with respect to gold and silver received from tributary nations. Rather than melting precious metals into ingots, it is more likely that the Persian treasury produced practical objects, like vessels, which were easy to store, and that could be used as gifts or currency if cut down to appropriate dimensions and weights. That process allowed the authorities to ensure that the vast quantities of metal owned by the royal treasury displayed a consistent quality standard, as exemplified by the inscribed bowls of Artaxerxes I. Surviving texts from the reigns of Nabonidus and Cambyses testify to the refining process applied to gold and silver levied through taxation (Zournatzi, *art. cit.*, notably p. 247-253).

This does not mean that all the fragments and objects of silver that were exchanged, traded, and stored across the Babylonian and Persian Near East respected these high standards of quality. The refining process that is documented for the period explicitly states a loss of weight in one case, which proves that the original metal displayed a lower fineness than the royal standard – perhaps the elusive 7/8<sup>th</sup> alloy (Zournatzi, *art. cit.*, p. 253). Just before the Persian conquest, a local official complains about receiving inferior silver alongside *ginnu* silver, and being unable to provide rations to his men as a result (Jursa, *op. cit.*, p. 482-484). The silver objects from the Nush-I Jan Hoard in Iran, predating the Achaemenid period by few decades, offer a broader range of fineness, from 89.4% to 97.9%. When the Great King spent some of his standardized silver, the objects used for that purpose would be later cut into pieces and fragments as they spread to the wider public, and some 'bad actors' could adulterate that same silver for a profit. This explains the cuts

and marks found on the Hacksilber hoards mixing coins and various fragments or ingots that characterize the Persian period (van Alfen 2004-05, *art. cit.*).

The imitative Athenian owls produced in Egypt, Asia Minor, the Levant and elsewhere are generally retrieved heavily cut, divided or even partially melted (P. van Alfen, 'Xenophon Poroi 3.2 and Athenian "owls" in Aegean-Near Eastern long-distance trade', in M. Asolati and G. Gorini, *I Ritrovamenti Monetali e I Processi Storico-Economici nel Mondo Antico*, Numismatica Patavina 12, 2012, Padova, p. 11-32, notably p. 22 and n. 46). Regulations and testing methods for silver had existed, however, for centuries, handled by royal, religious and civic authorities as well as merchants' associations. Official assayers delivered sealed and stamped silver, while silversmiths were required to adhere to royal laws. The standardization attested by the written sources, the stamps and seals that were common practice, combined with the high degree of fineness generally encountered in Hacksilber finds of the period, suggest a rather efficient and trusted system that underpinned a vibrant monetary economy using weighed silver.

As articulated by Powell, 'This does not mean that ancient Mesopotamians were unconcerned or unaware with quality but precisely the opposite: they knew exactly what was going on and did not feel it necessary to record the details. The increasing precisions with which the quality of silver is noted in the Chaldean-Persian period may indeed reflect a heightened concern for fineness in silver, but it cannot be legitimately interpreted as something wholly new' (Powell 1996, *art. cit.*, p. 234)

### ***In the Beginning Was Electrum***

The first coinage made of electrum that emerged in seventh-century Asia Minor offered a range of denominations produced with great weight accuracy (F. Velde, *art. cit.*, p. 497-503, with Fig. 1, Table 3 Fig. 2).

C. Thompson has argued that the Iron Age sealed bags of silver retrieved in the Levant and the coins struck in Western Asia Minor represent '...different manifestations of the same fundamental principles of using seals to verify standard weight (and purity) of metallic money...'. This link would be made visible by the legend 'I am the seal (or mark) of Phanes' on the late 7<sup>th</sup> century staters of the Phanes electrum series (Thompson, *art. cit.*, p. 87 and 89; on the mysterious Phanes series, W. Fischer-Bossert, 'Phanes: A Die Study, in van Alfen and Wartenberg, *op. cit.*, p. 423-476). Even if the silver fineness was quite standardized, the discussion about the weight standards has been brought further by E. Heymans. Neither the so-called chocolate bar ingots nor the bundled silver in sealed bags were conceived to respect standardized in weight. Examining the metrology and weight dispersion of the silver fragments, and the very high frequency enjoyed by pieces with weights between *ca.* 0.1 and 0.3 g., he concludes that they were used as small change in the context where weights had to be adjusted by using small fractions, which at the same time confirmed the prevalence of small-scale transactions (Heymans, *op. cit.*, p. 69-101). This said, thanks to the high silver fineness that has been measured, it is likely that the seals worked as a guarantee of

the silver quality. In that sense, the presence of seals as marks of denomination linked to precise weights represents the revolutionary innovation introduced by electrum coinage.

However, the choice of electrum, an alloy mixing gold and silver, to produce these standardized stamped oblong pieces of precious metal we call coins, remains peculiar. The contemporary Artemision tablets prove that accounting gold and silver separately was standard practice, with gold the accepted standard of value (J. H. Kroll, 'The Inscribed Account on Lead from the Ephesian Artemision', in van Alfen and Wartenberg, *op. cit.*, p. 49-63). The old theory about the native electrum from the river Pactolus has been decisively debunked. What naturally occurs in the river is gold of high purity. Recent metallurgic analyses conducted in gold mines located in northwest Anatolia, a region conquered by Lydia during the 7<sup>th</sup> century, confirm the evidence of ore deposits including substantial quantities of silver, in a 20%-40% range (N. Cahill, J. Hari, B. Öney, E. Dokumaci, 'Depletion Gilding of Lydian Electrum Coins and the Sources of Lydian Gold', in van Alfen and Wartenberg, *op. cit.*, p. 291-336). Those sources of precious metal could have provided the incentive to produce electrum coins.

Metallurgical analyses have demonstrated that the alloys used to produce electrum coins in Lydia was strictly controlled, with the royal Lion series' standard composition at 55% gold (with a margin of error lower than 2%), almost 45% silver, and around 1% copper for most of the coins recently analyzed. Whether natural electrum was debased, or gold and silver were mixed in fixed proportions, we cannot say for certain. But these coins could not have been produced using unadulterated naturally occurring electrum (M. Blet-Lemarquand and F. Duyrat, 'Elemental Analysis of the Lydo-Milesian Coins of the BnF Using LA-ICP-MS', in van Alfen and Wartenberg, *op. cit.*, p. 337-378).

Based on the interpretation of Herodotus (1, 50) with respect to the electrum and gold bars that had been offered by Croesus to Delphi, it has been argued for a long time that Lydian electrum had been valued using a theoretical 73% gold alloy, which would have provided the royal mint with a hefty margin. This ideal proportion may be supported by the minting under Croesus (*ca.* 560-546 BCE) of the 10.7 g pure gold stater after the 14.1 g electrum stater had been discontinued, while the lighter 8.06 g gold stater would reflect the actual metallic composition of the electrum stater (N. D. Cahill and J. H. Kroll, 'New Archaic Coin Finds at Sardis', *American Journal of Archaeology* 109.4, 2005, p. 589-617).

Since the difference between *ca.* 75% and 55% alloys is visible with the naked eye, this would explain the limited regional circulation of the Lydian electrum coinage. Its circulation at an overvalued price would have been enforced by the royal and local authorities, who would have used it to pay mercenaries, who would have had no choice but to spend locally (R. Osborne, *Greece in the Making 1200-479BC*, 2<sup>nd</sup> edition 2009 (1996), London and New York, p. 242. However, as posed by F. Velde, 'whom did the mercenaries convince to take the coinage in turn', which interrogates the ability of ancient states to enforce effective obvious currency overvaluations (F. Velde, 'A Quantitative Approach to the Beginnings of Coinage', in van Alfen and Wartenberg, *op. cit.*, p. 497-516, at p. 513). Alternative

explanations about the use of electrum have involved the question of bimetallism, suggesting the authorities would have used this mixed alloy to avoid having to deal with the unstable gold-to-silver ratio that a bimetallic system entailed (A. Bresson, 'The Choice of Electrum Monometallism: When and Why?', in van Alfen and Wartenberg, *op. cit.*, p. 477-496).

It appears, however, that the surface of electrum coins was frequently manipulated, whether enriched with gold, or silver depleted. Issues that have been tentatively attributed to cities (series following the Lydian-Milesian, Phokaian and Samian standards) included less gold than the royal types (Cahill et al, *art. cit.*; Blet-Lemarquand and Duyrat, *art. cit.*). This points toward seignorage as a major motivation for these authorities to produce electrum coins. We need to keep in mind that gold was at least ten times more valuable than silver and that lowering the proportion of gold by just 1% in an electrum mix, something very undetectable, was equivalent to removing 10% of a pure silver object of similar weight, something significantly more noticeable. Key questions remain unanswered, how the authorities could impose an overvalued coinage and still benefit, for instance, if the state had guaranteed redemption prices in gold and silver, all the benefits would have been lost. Clearly, the circulation of counterfeits demonstrates the incentive that such a coinage represented (Velde, *art. cit.*, p. 513, n. 32). The relatively short lifespan of the electrum coinage in Lydia and its replacement with a bimetallic system of separate gold and silver may demonstrate its lack of workability.

Electrum coinage did not disappear when Croesus shifted to pure gold and silver coinage. During the late Archaic period (second half of the sixth century), several mints in the Aegean region, whose exact identification is far from secure or complete, produced a range of electrum coinage alongside silver, including Clazomenae, Chios, Abdera, Ephesus, and possibly Athens (U. Wartenberg, 'Was there an Ionian Revolt Coinage?', in van Alfen and Wartenberg, *op. cit.*, p. 569-640; K. Sheedy, 'The Question of Archaic Athenian Electrum', in van Alfen and Wartenberg, *op. cit.*, p. 269-290)

Throughout the classical period, several cities were prolific in their striking of electrum coinages, with strong connections to trade in grain from the Black Sea region, among them Cyzicus, Mytilene, Phokaea and Lampsacus. Evolving gold-to-silver ratios (A. Ellis-Evans and J. Kagan, 'Bimetallism, Coinage, and Empire in Persian Anatolia', *Phoenix* 76, 2022, p. 178-227), and the different exchange rates against silver coinage that were practiced depending on where these coins were exchanged, does not allow us to estimate the seignorage for the issuing cities (S. K. Eddy, 'The Value of the Cyzicene Stater at Athens in the Fifth Century', *The American Numismatic Society Museum Notes* 16, 1970, p. 13-22; L. Mildenberg, 'The Cyzicenes: a Reappraisal', *American Journal of Numismatics* 5/6, 1993-94, p. 1-12). In the case of Cyzicus, it produced electrum coins with a consistent gold content, which explains while Olbia could define a fixed exchange rate (L. Dubois, *Inscriptions grecques dialectales d'Olbia du Pont*. Hautes études du monde gréco-romain 22, Geneva, 1996, p. 28-39, n° 14). The link between the grain trade and these series provides as well a different incentive for minting compared to the Archaic period: coins

using gold were less bulky than silver, and Athens (and possibly some Persian satraps) might have used Cyzicus and its electrum coins as a way of storing the cash reserves needed to balance the terms of its trade with the northern Pontic regions (S. Psoma, 'White Gold and Electrum in Literary Sources and Inscriptions', van Alfen and Wartenberg, *op. cit.*, p. 65-83, and 'How to Explain the Electrum Coinage of Cyzicus', *ibid*, p. 689-701; M. Mielczarek, 'Cyzicene Electrum Coinage and the Black Sea Grain Trade', *ibid*, p. 665-688). It is, therefore, reasonable to assume that the rationale behind minting electrum for the handful of Ionian cities up until the Hellenistic period differed quite substantially from what had motivated the Lydian kingdom in the first place – which does not exclude seignorage as one of the factors supporting the continuous production of electrum coinage.

### ***The Cities of Greece***

Traditionally, considerations about the steps that led to the establishment of a monetary economy in Greece based on silver start with Mesopotamia and Egypt and their currency practice anchored on weighed precious metal, and how their measuring units, talent and *mina*, traveled to Greece. After reviewing what little is known about the Mycenaean period, attestations of bartered and reciprocal exchange in the Homeric world are examined, followed by the birth of coinage in Lydia and its later transmission to Greece proper. At the same time, the difficult-to-interpret archeological finds of bronze or iron bars and spits and their links, following Plutarch, to the Greek monetary vocabulary – the *obolos*, one-sixth of a drachm, means 'spit', while *drachme* means 'handfull' – explores a potential parallel route followed by money during the Iron Age period. Ancient sources are scrutinized in order to fill some of the blanks, starting with the laws of Solon in sixth-century Athens. During that journey, a range of mythical heroes, as well as often ill-identified early historical figures, are encountered: Theseus of Athens, Erichthonius and Lycus also of Athens, Aglaosthenes from Naxos, Pheidon of Argos or Aegina. Their role, if any, remains generally obscure (eg: Schaps, *op. cit.*, p. 34-104; Seaford 2004, *op. cit.*, p. 23-146; P. Garner, *A History of Ancient Coinage 700-300 B.C.*, 1918, Oxford, p. 20-30, 67-82, 109-123 and 141-153). Some of these interpretations stand on very thin ground, as textual traditions may differ from the original texts, and the monetary nature of those offerings of spits is highly debatable (G. Davis, 'Dating the Drachmas in Solon's Laws', *Historia* 61/2, 2012, p. 127-158; Heymans, *op. cit.*, p. 181-184).

Recent research, supported by new archaeological finds, is now providing a more comprehensive picture, and highlights the dynamic economic characteristics of the pre-coinage period. Copper, silver and tin trade linked Mycenaean Greece, Cyprus and the Levant, and enormous quantities of copper have been retrieved in Bronze Age shipwrecks (A. Yu. Mozhaevsky, 'Bronze in Aegean of the Late Bronze Age: significance of metallurgy, delivering and consumption', *Non Ferrous Metals* 44, 2018, p. 43-48; I. Singer, 'Ships Bound for Lukka: A New Interpretation of the Companion Letters RS 94.2530 and RS 94.2523', *Altorientalische Forschungen* 33/2, 2006, p. 242-262, at p. 252-257). Silver objects excavated in Mycenae by the end of the Middle Bronze Age may originate from the Laurion mines, and some of this silver would have found its way to Egypt (J. Kelder, 'Mycenae, Rich

in Silver', in Kleber and Pirngruber, *op. cit.*, p. 307-317). We must note that there is no current consensus with respect to when the Laurion mines were first exploited, which means that the Laurion's signature may be linked to the exploitation of lead instead (J. R. Wood, Y-T Hsu and C. Bell, 'Sending Laurion Back to the Future: Bronze Age Silver and the Source of Confusion', *Internet Archaeology* 56, 2021, p. 1-57, <https://doi.org/10.11141/ia.56.9>). This does not change the overall picture of active trading relationships between the Levant and the Aegean world in the Bronze and then the Iron Age (Heymans, *op. cit.*, p. 161-167, 203-212).

Similar processes are relevant well beyond Greece, observed in many different areas of late Bronze to early Iron Age Europe (eg T. Poigt, 'Weighing premonetary currency in the Iberian Iron Age', in D. Brandherm, E. Heymans and D. Hofmann, *Gifts, Goods and Money. Comparing currency and circulation systems in past societies*, 2018, p. 105-132). It has even been argued that some forms of pan-European weight standards emerged during the Bronze Age (N. Ialongo and G. Lago, 'A small change revolution. Weight systems and the emergence of the first Pan-European money', *Journal of Archaeological Science* 129, 2021, <https://www.sciencedirect.com/science/article/pii/S0305440321000492?via%3Dihub>).

In eighth-century Crete, cauldrons and various utensils were used as mediums of payment (Schaps, *op. cit.*, p. 80-92). Silver from Aegean sources and even southern Gaul retrieved in the Levant in late Bronze and early Iron Age Hacksilber deposits provide strong evidence with respect to continuous trading relationships between these regions (L. Gentelli, J. Blichert-Toft, G. Davis, H. Gitler and F. Albarède, 'Metal provenance of Iron Age Hacksilber hoards in the southern Levant', *Journal of Archaeological Science* 134, 2021, p. 1-10).

During the Archaic period, the existence in the Greek world of late sixth century hoards mixing Hacksilber with coins (notably the Kolophon hoard, a hoard from Caria, and another from the Brutium near Sambiasse), the valuation in weights of silver used by the Solonian and Eretrian laws, the fragmentary accounting text from the Artemision, the extreme accuracy and the number of weight standards displayed by the small silver coinage fractions minted in the sixth century, imply that silver (and mostly gold during the Mycenaean period) was used as a monetary medium before being used to produce coins (J. Zurbach, 'Metal money before coinage in the Aegean, ca. 1400-600 BC', in L. Rahmstorf, G. Barjamovic and N. Ialongo (eds.), *Merchants, Measures and Money: Understanding Technologies of Early Trade in a Comparative Perspective* 2, Wachholtz Verlag, 2021, p. 317-333; J. H. Kroll, 'The Monetary Use of Weighed Bullion in Archaic Greece', in W. Harris (ed.), *The Monetary Systems of the Greeks and the Romans*, Oxford, 2008, p. 12-37; H. Kim, 'Archaic Coinage as Evidence for the Use of Money', in A. Meadows and K. Shipton, *Money and its Uses in the Ancient World*, Oxford, 2001, p. 15-21). The continuous monetary use of standardized metallic objects as well as food staples into the Classical period represents a further testimony to these pre-coinage traditions and practices surviving the onset of coinage in some regions – precious metal vessels, tripods, and the use of arrow heads in the Black Sea region (von Reden, *art. cit.*, p. 157-159; Heymans, *op. cit.*, p. 196-203).

All these observations converge toward the existence of monetary transactions since the Mycenaean period in Greece that well preceded the emergence of coinage in Lydia, a picture not too dissimilar to what has been observed in contemporary Mesopotamia and the Levant (albeit probably far less wealthy). Rather than coinage spreading from Western Asia Minor into a vacuum, this suggests a more complex process where an existing monetary economy was triggered into adopting coinage by Lydia and its immediate neighbors. Essentially, two distinct monetary paths converged and merged into the Classical Greek coinage systems.

### ***Why did Greek city-states opt for coinage?***

These considerations bring us back to our initial question. Greek cities started to produce silver coins that stylistically resembled the earlier electrum series during the first half of the sixth century. Mesopotamia shunned coinage until Alexander the Great (and kept weighing metal even after the production of coinage on a massive scale); Phoenicia and other advanced societies also did not rush to coinage. On the other hand, more than a hundred Greek cities wasted no time and minted their own little silver coin series by the turn of the sixth and fifth centuries (Osborne, *op. cit.*, p. 238-241).

What made Greece different? If one wishes to avoid all the *topoi* that surround the ‘Greek miracle’ in the ‘Western mind’ (including trying to figure out what made the ‘Greek mind’ different and implicitly more advanced than let’s say the Persian mind or the Egyptian mind for that matter), one needs to get back to the basics.

At first, one consideration for coinage needs to be absolutely excluded: with at least fourteen different identified weight standards at the outset of silver coinage, the Greek cities that minted coins did not intend to facilitate inter-city trade (Osborne, *op. cit.*, p. 243; Psoma 2015b, *art. cit.*). In that respect, it is noteworthy that when Egestae wished to entice the Athenians to undertake the expedition to Sicily during the Peloponnesian War in 415 BCE, they sent sixty talents of uncoined silver (*ἑξήκοντα τάλαντα ἀσήμου ἀργυρίου*) rather than coins, since their weight standards differed from the Attic standard (Thucydides 6, 8, 1).

Earning income from seignorage could have represented the obvious and primary motivation behind the rapid spread of coinage in the Greek world. A coin is defined by three different values: intrinsic, legal, and trade value (R. Bogaert, *Banques et banquiers dans les cités grecques*, Leyden, 1968, p. 316). The intrinsic, or commodity value, is represented by its bullion content. The legal value is defined by the issuing state, where it is legal tender, and is expected to stand above the commodity value. The commercial value is how it is traded outside of its area of legal circulation. In most of the Near East, Greek coins were treated as bullion, which means that their local commercial value converged toward their commodity value. At the same time, Athenian coins seem to have enjoyed a premium in most of the Greek world.

The Delphic accounts dated 336 BCE attest that the mint master received about 2% of the total amount of silver being coined (*Corpus des Inscriptions de Delphes* 2, 75). Since this coinage included large denominations mostly (most of the coins averaged 12g: P. Kinns, 'The Amphictionic Coinage Reconsidered', *The Numismatic Chronicle* 143, 1983, p. 1-22), one should consider this as a floor, as fractional coins cost relatively more to produce. If a city did not wish to subsidize its coinage, then the legal value should have exceeded the intrinsic value by at least 2%.

Some degree of overvaluation and the desire to prevent silver from being exported must be one of the factors behind those civic regulations providing locally minted coins with sole legal tender status. Corinth imposed the use of her own coins to her colonists: Thucydides 1, 27, 1. Some cities were more restrictive, and forced local conversion of all foreign coins, like Olbia in the fourth century (Dubois, *op. cit.*, p. 28-39, n° 14). In fourth century Athens, Athenian coins enjoyed legal tender privilege, while foreign coins of good Attic standard could be accepted in private transactions (S. Psoma, 'The Law of Nicophon (SEG 26.72) and Athenian Imitations', *Revue Belge de Numismatique et de Sigillographie* 157, 2011, p. 27-36; R. Stroud, 'An Athenian Law on Silver Coinage', *Hesperia: The Journal of the American School of Classical Studies at Athens* 43/2, 1974, p. 157-188). This does not mean that each single Greek city only allowed its own coinage to circulate at the exclusion of any other. Many Greek cities never struck coins or did so very irregularly (J. Melville-Jones, 'Why did the Ancient Greeks strike coins?', *Journal of the Numismatic Association of Australia* 17, 2006, p. 20-30, notably p. 25-26). In such case, they relied on coinages issued by more powerful neighboring cities or on widely accepted coinages. This is illustrated by hoards showing the existence of regional circulation pools, supplemented by Aegina and Athens (T. Figueira, *The Power of Money. Coinage and Politics in the Athenian Empire*, Philadelphia, 1998, p. 23-47; C. M. Kraay, 'Hoards, Small Change and the Origin of Coinage', *The Journal of Hellenic Studies* 84, 1964, p. 76-91).

At the same time, a well-known statement of Xenophon is generally interpreted as to state that Athenian coin were the only coins that could be sold abroad at a profit. This implies that all other coins suffered from a discount in the earlier fourth century (Xenophon 3, 2: "In most cities (foreign) merchants must seek a return cargo, since they use coinage which is not acceptable elsewhere. But at Athens, while it is possible to export a great amount of material which is needed elsewhere, if they do not wish to take on a return cargo they can still make a good profit (*kalên emporian*) by taking away silver (*argyrion*); for wherever they sell it, they always get more than the original (investment)", transl. John R. Melville Jones, *Testimonia Numaria. Greek and Latin Texts concerning Ancient Greek Coinage*, vol I, Spink, London, 1993, text 92, p. 62-63. Let's note that Xenophon might have meant that silver bullion, rather than Athenian coins, represented the commodity foreign merchants could sell at a profit: P. van Alfen, *Pant 'Agatha Commodities in Levantine-Aegean Trade during the Persian Period, 6-4th c. B.C.*, DPhil Dissertation, The University of Texas at Austin, 2002, p. 117, n. 629, [http://numismatics.org/digitalibrary/docs/van\\_Alfen\\_Pantagatha.pdf](http://numismatics.org/digitalibrary/docs/van_Alfen_Pantagatha.pdf)).

Closed monetary areas with a significantly overvalued local coinage are well attested during the Hellenistic period, the most prominent being the Ptolemies in Egypt, 17% lighter than the Attic standard, and the Attalids in Asia Minor, 25% lighter (G. Le Rider, 'Histoire économique et monétaire de l'Orient hellénistique', in *Annuaire du Collège de France, 1997-1998. Résumé des cours et travaux*, 98, 1998, p. 783-809; A. Meadows, 'The Closed Currency System of the Attalid Kingdom', in P. Thonemann (ed.), *Attalid Asia Minor: Money, International Relations and the State*, Oxford, 2013, p. 149-205). Delos used a heavily overvalued local coinage between 317 and 165 BCE as an independent island, thanks to the privileged status it owed to its sanctuary and its *emporion*. The Euboean *koinon*'s local coinage would have used a 12% debased Attic standard, and the Delphic accounts provide evidence of local coinages underweight by ca. 14% (O. Picard, 'Monnaie ολοσχερησ, monnaie de poids réduit, *apousia* en Eubée, à Délos et ailleurs', in *Charakter: apheroma ste Manto Oikonomidou*, Athens, 1996, p. 243-250).

The most successful closed monetary zones relied on positions of strength. Egypt and the Attalid Kingdom benefited from particularly privileged political and commercial positions. In reality, there were limits to what local authorities could enforce. When Byzantium and Chalcedon implemented a ca. 19% overvalued common coinage in the later third century, they failed and the system broke down after about fifteen years, probably under pressure from merchants and other economic actors (Mørkholm, *art. cit.*, p. 299). At the same time, strong evidence points toward foreigners requiring to be paid in a coinage respecting Attic standards when dealing with a local overvalued coinage. It is explicitly attested for Euboea, Chios, and Arkesine in the Cyclades, and it is significant as well that the Amphictionic authorities at Delphi felt obliged to mint a full-weight Aeginetic coinage in 338-333, using their stock of undervalued silver coins, and losing 14% in the process (Picard 1996, *art. cit.*, p. 244-245; M.-Chr. Marcellesi, 'Commerce, monnaies locales et monnaies communes dans les états hellénistiques', *Revue des Études Grecques* 113/2, 2000, p. 326-358, at p. 338-343; Kinns, *art. cit.*, p. 13).

However, we have very scant evidence for the Archaic and early Classical periods.

It has been generally accepted that classical Athens charged 3% or 5% to produce coins from silver bullion or non-Athenian coinage (O. Mørkholm, 'Reflections on the Production and Use of Coinage in Ancient Greece', *Zeitschrift für Alte Geschichte* 31/3, p. 290-305, at p. 292-293; Figueira, *op. cit.*, p. 239-245 and 360; J. H. Kroll, 'The Reminting of Athenian Silver Coinage, 353 BC', *Hesperia* 80, 2011, p. 229-259, however dismissing the 105 drachms value attributed to the commercial *mina* as an additional argument supporting 5% instead of 3%: n. 23, p. 236-237; see as well the 3.5% charged on the Cyzicene electrum staters: Eddy, *art. cit.*, p. 21-22). Athens derived additional income as well from the Laurion mines through taxation and leasing (G. Thür and M. Faraguna, 'Silver from Laureion: Mining, Smelting, and Minting', in B. Woytek (ed.), *Infrastructure and Distribution in Ancient Economies. Proceedings of a conference held at the Austrian Academy of Sciences, 28-31 October 2014*, Vienna, 2018, p. 45-58).

But most Greek cities did not control a mining district.

Reduced weight standards developed early as coinage spread (S. Psoma, 'Choosing and Changing Monetary Standards in the Greek World during the Archaic and the Classical Periods', in E. M. Harris, D. M. Lewis and M. Woolmer (eds.), *The Ancient Greek Economy. Markets, Households and City-States*, 2015, Cambridge, p. 90-115). In southern Italy in ca. 550-525 BCE, four Greek cities started to mint incuse silver coins using a reduced Corinthian standard, likely creating a closed monetary zone with a 7% overvaluation (G. Le Rider, 'À propos d'un passage des *Poroi* de Xénophon: la question du change et les monnaies incuses d'Italie du sud', in G. Le Rider, K. Jenkins, N. Waggoner and U. Westermark (eds), *Kraay-Mørkholm Essays. Numismatic studies in memory of C.M. Kraay and O. Mørkholm*, 1989, Louvain-la-Neuve, p.159–172). At about the same period, a small cluster of Greek cities on the Thracian coast (the 'Thasian Peraia') adopted a reduced Aeginetic standard 20% lighter (S. Psoma, 'Did the so-called Thracio-Macedonian standard exist?', in: U. Wartenberg and M. Amandry (eds.), *ΚΑΙΠΟΣ. Contributions to Numismatics in Honor of Basil Demetriadi*, New York, 2015, p. 167-190, at p. 174-179). However, such a significant weight reduction is not the norm, and we have no actual evidence that these cities managed to enforce a one-to-one exchange rate with full-weight Aeginetic coins. Other early reduced standards remained quite limited in scope. For instance, still in Thrace, Abdera and two neighboring city-states opted for the weight standard of Chios, with a ca. 4% reduction (Psoma, *ibid*, p. 179-182), while several Chalkidic cities followed a 2% to 4% reduced Milesian standard, further reduced by Macedonia in the early fifth century with a ca. 8% discount (*Ibid*, p. 171-175).

Some of these underweight standards might have served other purposes. Samos, whose coinage is mentioned in the sixth century, originally used a 14.2g Milesian standard for its stater, then reduced it twice (Psoma 2015a, *art. cit.*, p. 94-95). By the turn of the sixth century, its staters weighed 13-13.1g on average, a seemingly 8 to 9% overvaluation if we assume coins from Miletus were forcibly exchanged at a one-to-one ratio. After 439 BCE, with Samos turning into a key ally of Athens, it adopted the Attic standard until the end of the Peloponnesian war. In reality, Samos may have initially reformed its weight standard to align with the Attic monetary system. Its reduced staters were equivalent to three Athenian drachms (J. P. Barron, *The Silver Coins of Samos*, London, 1966, p. 9 and 19-39). It is then possible that the heavier Milesian coins enjoyed a local premium, as overvaluing its coinage may not adequately explain Samos's successive reforms. In the late fifth century, the disruption of silver production at the Laurion increased the value of silver vs. gold, leading to the adoption of lower silver coinage weight standards. This probably explains the contemporary spread of the 3.8 g drachm Chian standard in Asia Minor, and the adoption in Thrace of a 10% reduced Milesian standard (Aneurin Ellis-Evans and Jonathan Kagan, *art. cit.*, p. 190-196).

In some other cases, apparently lighter weight standards can be explained by the long circulating life of some of these issues, like the late fifth century Acarnanian cities with the

Corinthian standard (S. Psoma, 'Le monnayage federal acarnanien de époque classique', *KLIO* 89/1, 2007, p. 7-23).

Finally, all these reduced standards came to existence sometime after the major weight standards they used as reference had spread. The very first cities that struck silver coinages, among them Aegina, Corinth, Miletus, Chios, and the cities of Euboea like Chalkis, were not trying to produce underweight coins with reference to more ancient models since there were none (Psoma 2015a, *art. cit.*, p. 95). All the systems of the Greek mainland and its neighboring islands were compatible at the higher *mina* and talents levels – 436 and 26,196 g respectively (J. Kroll, 'Observations on monetary instruments in pre-coinage Greece', in M. S. Balmuth (ed.), *Hacksilber to coinage: new insights into the monetary history of the Near East and Greece, a collection of eight papers presented at the 99th annual meeting of the Archaeological Institute of America*, 2001, New York, p. 77-91, table 5.1 at p. 86). This rules out any form isolated overvaluation at that early stage.

In reality, the situation must have been challenging for the initial issuers at the onset of silver coinage in the mid-sixth century, as coins needed to gain acceptance in a society accustomed to valuing gold and silver by weight. In that respect, it is noteworthy that most silver coinages used very pure silver from start, with fineness of 95% and above (Le Rider 1989, *art. cit.*, p. 162). Coins competed with Hacksilber and circulated together as proven by the existence of late sixth century mixed hoards (Zurbach, *art. cit.*, p. 323-324). Even later, the fact Athenian (and other) coins were treated for their intrinsic value in Egypt, the Near East and other major economic partners, and imitated as such, provides additional evidence that excessive overvaluations would have been hard to enforce (Sicily and Magna Graecia exhibit the same appetite for Athenian and Corinthian coins, traded as a silver commodity: C. Rowan, 'Coinage as commodity and bullion in the western Mediterranean, ca. 550–100 BCE', *Mediterranean Historical Review* 28/2, 2013, p. 105-127).

As most Greek cities did not control natural sources of silver, they had to acquire silver from their citizens or from foreign merchants or even foreign polities in order to produce a coinage. This is very different from the later periods where overall silver availability had increased multifold thanks to the Laurion, the Macedonian mines, and Alexander's conquest of the Persian Empire. The sellers had no reason to accept a discount that would have exceeded the benefits enjoyed by the possession of any given coinage, especially with those characterized by limited areas of circulation. Another avenue could have involved requiring citizens to pay tax in silver bullion or full-weight foreign coins to produce reduced weight coins. This would have threatened the viability of any locally overvalued coinage, since a necessary condition for any currency system to sustain itself is to enjoy legal tender status locally.

If we assume that most early mints seeking seignorage could not charge more than 5% on average, knowing the labor and brassage involved by producing coinage, these fees might have been just sufficient to balance costs, especially for smaller cities that lacked economies of scale. This may be one of the reasons, alongside the need to prevent silver

from being exported, behind the production of debased silver coinage by Mytilene and Methymna in Lesbos (L. Lazzarini, 'A Contribution to the Study of the Archaic Billon Coinage of Lesbos', *Obolos* 9, 2010, p. 83-111). Then silver is a relatively cheap metal, unlike electrum, and earning a few percent may not have significantly improved municipal finances. It is even possible that some Greek cities, especially when minting tiny silver fractions until the arrival of bronze in the later fifth century, produced coinage at a loss and effectively subsidized it, which would further explain why the Phoenicians and others did not follow suit for a century and a half (J. Melitz, 'Reasons for the Lydian electrum coins and the succeeding Greek silver coins in antiquity', *Centre for Economic Policy Research*, 2019, <https://cepr.org/voxeu/columns/reasons-lydian-electrum-coins-and-succeeding-greek-silver-coins-antiquity>).

### **A Question of Trust**

Public trust is the cornerstone of any currency system. The obvious issue for economic agents using a currency system based on commodity values is determining the metrological characteristics of the amounts used for payments. Weights are relatively easy to measure, scales and standardized weights were widespread, and adulterating weights was quite a common practice, albeit harshly punishable by law (M. Rizzi, 'Ex iniquitatibus mensurarum et ponderum: Appunti intorno alle frodi metrologiche nell'antichità greca e romana', *The International Review of Roman Law* 11, 2013, p. 288-331). However, assessing metallic fineness is more challenging.

During the earlier periods in Mesopotamia when silver was likely used for high-value transactions mostly alongside barley for lower values, this may not have mattered too much since silver was transacted by sophisticated actors like temple administrators and merchants.

As the use of silver became prevalent across the entire scale of values, reaching non-specialized users, the situation evolved. Ensuring some degree of trust became a concern for political authorities. This is probably the main reason why official bodies became increasingly involved as we move into the Neo-Assyrian period and beyond. Effectively, the evidence of royal authorities defining, processing and controlling quality standards is compelling for the Neo-Babylonian and Achaemenid periods, even though most operational details are lacking. Based on textual testimonies and metallurgic analyses, the silver that circulated from Egypt to Persia consistently displayed a very high level of fineness, which cannot have been achieved without official intervention. It seems the authorities effectively succeeded in implementing a trusted medium of exchange.

The same 'democratization' of silver took place in Archaic Greece. However, no central authority existed. Or, better said, hundreds of authorities operated across the Greek world. Silver would enter any of these cities from multiple sources, including from local mines in a few rare cases, like Siphnos (Herodotus 3, 57, 2), Thasos, some Macedonian cities and tribes, and obviously Athens with the Laurion mines. In almost all other cases, prior to the

start of coinage, silver would be brought in by merchants, local or foreign. In the absence of an imperial power capable of implementing consistent panhellenic regulations, these cities and their citizens were left pretty much on their own in dealing with the influx of silver from multiple origins that circulated. Silver could have been assayed by ‘certified’ silversmiths and then recirculated in sealed bags, as in Mesopotamia and the Levant. This could have worked for as long as the use of silver was limited to long-distance trade and handled by merchants, who could absorb the cost of ensuring the quality of the silver they received and the integrity of these sealed bags as they traveled. However, as silver trickled down and was used for daily transactions, traceability would have been lost in the process.

Minting coins must have represented the ideal solution to this problem. Once assayed and stamped, standardized coins carrying the seal of the city and denominational characteristics could be trusted locally, allowing retail and local markets to function more efficiently. As a result, the legal enforcement of a local coinage should not be seen principally as a coercive quasi-tax, even if the city could extract a profit. More importantly, implementing a locally controlled and guaranteed coinage ensured trust and improved the way local markets operated, hence the concept of acceptable money expressed in Greek by the word *dokimos*, meaning approved or valid (Figuiera, *op. cit.*, p. 57 and 398-400, as well as Picard 1996, *art. cit.*, p. 248. See the use of that term as well by Plato, *Laws* 749a, whose purpose is different since the aim is to control social mobility and excessive wealth in his ideal city). Very significantly, a sixth century Eretrian inscription that predates by about 25 years the introduction of an Eretrian coinage uses the term *chremata dokima*, which can be understood whether as meaning ‘acceptable foreign coins’ or ‘acceptable weighed bullion’. (F. Cairns, ‘The "Laws of Eretria" ("IG" XII. 9 1273 and 1274): Epigraphic, Legal, Historical, and Political Aspects’, *Phoenix* 45/4, 1991, p. 296-313; von Reden, *art. cit.*, p. 158; Huymans, *op. cit.*, p. 224). It documents the need to protect local markets prior to the introduction of local coinage, and possibly explain why the city produced its own coins shortly after issuing this regulation

Greek thinkers were very much aware of the link between prosperity and trust. ‘Trust (*πίστις*) is the first thing that arises out of respect for law (*ἐκ τῆς εὐνομίας*)– [trust], which provides great benefits to humankind, and is to be classed among the great goods. For the sharing of resources arises out of this [sc. trust], and accordingly even if they are scarce, they still suffice, because they are circulated, whereas, without it, they would not suffice, even in abundance.’ (from the fourth century BCE Anonymous Iamblich, fragment 7: P. S. Horky, ‘Anonymus Iamblich, *On Excellence (Peri Aretēs)*. A Lost Defense of Democracy’, in D. Wolfsdorf (ed.), *Early Greek Ethics*, Oxford: Oxford University Press, 2020, p. 262-292, at p. 284-286 with comments). This is not surprising at all that the standard term for coin, *nomisma*, derived from *nomos*, which means law, convention, custom (A. Bresson, ‘Le marché des philosophes: Platon, Aristote et la monnaie’, in V. Chankowski and P. Karvonis (eds.), *Tout vendre, tout acheter. Structures et équipements des marchés antiques. Actes du colloque d’Athènes, 16-19 juin 2009, Bordeaux and Athens, 2012*, p. 365-409). Minting coins was a truly legal act, whose aim was to support overall prosperity via the rule of law.

At the end, for many of those little city-states, ensuring the circulation of a trusted and very fine silver coinage represented a major competitive advantage compared to a situation where silver had to be systematically assayed. Coins were logically safer than Hacksilber: minting fake coins involved some physical infrastructure and workforce that could not be easily hidden from local authorities. And producing fakes from a distance to escape scrutiny involved other logistical costs and challenges. Coins brought with them some degree of traceability. In order to establish trust, it was crucial that any coinage enjoyed a privileged position as legal tender, acceptable for the payments of taxes, harbor dues, and most local transactions. In this respect, it is noteworthy that shortly before Egypt fell again under Persian domination, its last indigenous pharaoh, Nectanebo II, issued a relatively pure gold coinage bearing the hieroglyphic legend "nwb nfr," which is best interpreted as "perfect gold", referring to its high quality. Independent Egypt felt the need to display the guarantee its coinage carried to affirm its trustworthiness in the face of the forthcoming Persian onslaught (Thomas Faucher, Wolfgang Fischer-Bossert, Sylvain Dhennin, 'Les monnaies en or aux types hiéroglyphiques nwb nfr', *Bulletin de l'Institut Français d'Archéologie Orientale* 112, 2012, p.147-169; ).

The consequences of regulating and overvaluing local coinages meant that many lacked transportability. Money changers charged fees, with surviving records indicating rates ranging from 3% to 9% (Marcellesi, *art. cit.*, p. 344-346; Le Rider 1989, *art. cit.*, p. 164-165 and 172).

The sustainability of any coinage was clearly linked to its privilege of being legal tender *somewhere*. The more economically and politically important a city, the more widespread its coinage's area of circulation. Significantly, after Aegina lost its independence, with its citizens finally expelled by Athens (456 and 431 BCE), countermarked Aeginetan coins became widespread. Without a home market, their acceptability was challenged – or at least their acceptability beyond their intrinsic value (Figueira, *art. cit.*, p. 119, n. 21 and p. 126-127; Milbank, *op. cit.*, p. 18-22). At the same time, the lower gold-to-silver ratio experienced by the end of the fifth century may have contributed to this countermarking phenomenon (Aneurin Ellis-Evans and Jonathan Kagan, *art. cit.*, p. 193).

Counterfeiting and adulterating coinage represented a serious threat to the whole process yet. Punishments were harsh, including confiscation, fines, exile, and the death penalty. City officials willfully lowering the quality of the alloy used to mint coins face the death penalty as per the fourth century BCE monetary pact between Mytilene and Phokaia (*JG* XII, 2, 1, with A. J. Heisserer, 'The Monetary Pact between Mytilene and Phokaia', *Zeitschrift für Papyrologie und Epigraphik* 55, 1984, p. 115-132). The same applied to the mint workers from early second century Dyme in Peloponnesus (*Greek Economic Inscriptions*, Scuola Normale Superiore, <https://geionline.sns.it/search/document/GEI031>). Demosthenes alleged that the death penalty for adulterating silver was current at the time of Solon and possibly in Athens in his own time: 24, 212 and 20, 167. Diogenes the cynic and his father Hikesias both went into exile after being found guilty of counterfeiting: Diog. L. 6, 1.

In Athens, civic officials oversaw the quality of the coins that circulated in the agora (Psoma 2011, *art. cit.*; Stroud, *art. cit.*). Literary, epigraphic and archaeological testimonies confirm the prevalence of counterfeiting (R. Conn, *Prevalence and Profitability: The Counterfeit Coins of Archaic and Classical Greece*, Master Thesis, Florida State University, 2007). Among the 129 Athenian silver coins excavated in the Agora, 22 were plated with a bronze core. This does not mean that 20% of the precious-metal coins that circulated in Athens were fake. These plated coins were simply much more likely to be discarded (J. Kroll, *The Athenian Agora: Results of Excavations Conducted by The American School of Classical Studies at Athens*. Vol XXVI *The Greek Coins*, Princeton, 1993, p. 4). It is impossible to estimate the proportion of fakes that circulated in classical Greece, because various forms of selection by authorities and users led to their withdrawal and under-representation in hoards. However, it is probably safe to estimate that their share remained sufficiently low, as the Greek monetary economy thrived.

### ***Coinage and daily trade***

Thanks to Lydia, the Greeks adopted and adapted the coinage concept for their daily use, employing the one precious metal that they could access more easily: silver.

That Archaic coinage could be used for retail trade had been dismissed, however for a long time, since early archaeologists focused on large and visible objects. Most Greek coins that were retrieved were large denominations and travelled to distant locations. The predominant view was therefore that they were used for long-distance trade. But this picture can no longer be supported.

The smallest electrum fraction minted in Lydia, the 1/96<sup>th</sup> stater of ca. 0.15 g, would have fed someone for a week (Velde, *art. cit.*, p. 512, with prices from F. Joannès, ‘Prix et salaires en Babylonie du VIII<sup>e</sup> au III<sup>e</sup> siècle avant notre ère’, in J. Andraeu and R. Descat (eds.), *Prix et formation des prix dans les économies antiques*, 1997, Saint-Bertrand de Comminges, p. 313-333). This coinage was, therefore, not conceived as a medium of daily local trade, contrary to Herodotus’s comment. When Croesus shifted to a gold and silver coinage, the smallest fraction, 0.44 g of silver, more than halved the value of the smallest available denomination. When coinage spread to central Greece in the second half of the sixth century, fractions weighing as little as 0.1 g appeared (Kim, *art. cit.*, p. 12-13), generally retrieved not too far from their minting location. As the multi-century trend toward a reduction of silver’s purchasing power continued, there is little doubt that these tiny coins could satisfy the retail market’s needs.

One drachm of ca. 4.5 g represented the typical daily wage for a skilled worker during the classical period (An unskilled worker could expect two obols per day during the Peloponnesian War. An Athenian rower earned between three obols and one drachm a day. At the same time, an Athenian citizen serving as a juror earned two and then three obols a day in the later fifth century. By the early fourth century, a day attending the assemblies

brought one drachm: M. M. Markle, 'Jury Pay and Assembly Pay at Athens', *History of Political Thought* 6/1-2, 1985, p. 265-297. In the late fourth century at Eleusis, daily wages for unskilled construction workers of 1.5 drachms per day, and 1.25 to 2.5 drachms for skilled workers, are epigraphically reported: M. Deene, 'Ancient demographics, partible inheritance and distribution of wealth in classical Athens and Sparta: a comparative perspective', *Revue belge de philologie et d'histoire* 94/1, 2016, p. 27-46, at p. 39). Available prices for the third century provide a mina of fish, ca. 430 g, worth one obol on average (Marcellesi, *art. cit.*, p. 231). This translates into 0.1 g of silver buying approximately 50 g of fish. Herodotus's comment, describing the Lydians as the first who coined gold and silver and the first who practiced retail trade, at last, makes sense: in his mind, as a Greek whose life spanned the later sixth century and the first half of the fifth century, coinage and retail exchange were intertwined realities.

### ***The monetary rise of a silver-less Island***

Aegina represents a prototypical case. Like the other major mints from central Greece in the Archaic period, Athens and Corinth, it was a trading hub, and possibly the most active of them. However, unlike Athens but like Corinth, it had no silver mines of its own. It struck very fine coins, generally over 98% purity – like most other Archaic mints. Aegina is the first state of central Greece to mint coins in large quantity from probably 580-570 BCE (J. H. Kroll and N. M. Waggoner, 'Dating the Earliest Coins of Athens, Corinth and Aegina', *American Journal of Archaeology* 88/3, 1984, p.325-340 ; S. R. Milbank, 'The coinage of Aegina', *Numismatic Notes and Monographs* 24, 1924, p. 1-66, who had advocated a higher chronology consistent with a more ancient historical tradition that relied much on a literal interpretation of ancient literary sources). Its coins are found over a broad area, as far as Egypt, Asia Minor and other locations, although most numerous in hoards from the Cyclades, Crete and their vicinity (Schaps, *op. cit.*, p. 105; Osborne, *op. cit.*, p. 244).

The geographic proximity between Aegina and Siphnos had for a long-time convinced numismatists that Aegina has benefited from its mines, like Athens did from Laurion, even if other sources of silver were acknowledged (O Picard, 'Monnaie et circulation monétaire à l'époque classique', *Pallas* 74, 2007, p. 113-128, at p. 114). However, the most recent analyses point to much more diverse sources of silver. Out of a sample of 45 Aeginetan coins, just six of them present lead isotopes fully consistent with Siphnos. More than half can be traced to sources in Macedonia and Thrace. Another eight are from Laurion. And two come from sources in Iberia and central Gaul (Z. A. Stos-Gale, 'The sources and supply of silver for Archaic Greek coinage: A re-evaluation of the lead isotope and chemical data', *Der Anschnitt* 34, 2017, p. 203–219, at p. 207-210; Z. A. Stos-Gale and G. Davis, 'The Minting/Mining Nexus: New Understandings of Archaic Greek Silver Coinage from Lead Isotope Analysis', in K. A. Sheedy and G. Davis, *Metallurgy in Numismatics 6. Mines, Metals, and Money Ancient World Studies in Science, Archaeology and History*, London, 2020, p. 87-100).

How did Aegina – and the many other cities with no direct access to silver – acquire the quantity of metal needed to mint? This question remains intriguing and largely unsolved, and we can only suggest possible outcomes. The taxation route must probably be dismissed. The transition to fully functional tax-states occurred during the later Archaic period only (H. van Wees, *Ships and Silver, Taxes and Tribute. A Fiscal History of Archaic Athens*, London, 2013, p. 17-37). In a foreign trade-dedicated harbor city like Aegina, harbor dues would have represented most of the public income. However, paid at a rate frequently set at 2% of imported and exported goods in the Greek world (L Migeotte, *The Economy of the Greek Cities: From the Archaic Period to the Early Roman Empire*, Berkeley, 2009, p. 50), they would not have provided enough resources to sustain a coinage of that size. Moreover, it is likely that the city required its own coinage to be used for tax payments.

A second scenario involves free minting, *i.e.*, that the mint would have accepted metal or foreign coins brought by citizens or foreigners alike against a fee and provided Aeginetan coin in return as their own. This remains a highly contested topic among economic historians of the period. The widespread practice of free-minting is not supported by the available evidence in the Greek world (F. de Callataÿ, 'La frappe libre a-t-elle existé dans l'Antiquité gréco-romaine?', in C. Alfaro, C. Marcos and P. Otero (eds.), *Actas del XIII Congreso Internacional de Numismática*, I, Madrid, 2005, p. 211-218). However, the process by which the Athenian mint acquired the silver extracted from the Laurion probably involved the owners of mining rights selling a significant portion of their production to the city. The tax levied on the silver production was too low to account for the very large minting of silver owls in the classical period, while the Laurion leaseholders had to cover significant production expenses (P. van Alfen, 'Hatching Owls: Athenian Public Finance and the Regulation of Coin Production', in F. de Callataÿ (ed.), *Quantifying monetary supplies in Greco-Roman times*. Pragmateiai 19, 2011, p. 127-149; C. Flament, 'The Athenian Coinage, from Mines to Markets', *Journal of Ancient Civilizations* 34/2, 2019, p. 189-209; M. Faraguna 'La città di Atene e l'amministrazione delle miniere del Laurion', in *Symposion 2003. Vorträge zur griechischen und hellenistischen Rechtsgeschichte (Rauischholzhausen, 30. September – 3. Oktober 2003)*, H.-A. Rupprecht (ed.), Vienna, 2006, p. 141-160; about the tax on mining: G. Davis, 'Mining Money in Late Archaic Athens', *Historia: Zeitschrift für Alte Geschichte* 63/3, 2014, p. 257-277).

Finally, the second half of the fifth century Athenian Standards Decree (*IG I<sup>3</sup> 1453*), as decisively demonstrated by a recent fragment, enforced the circulation Athenian owls among Athens' allies, regulating the conversion of local silver into Athenian coins against a 3% or 5% fee (van Alfen 2011, *art. cit.*, p. 141-143; M. B. Hatzopoulos, M.B., *Bulletin Épigraphe*, *REG* 118, 2005, #355, p. 507-508). Even if free minting never took place, the juxtaposition of several mechanisms involving leaseholders of mining rights and Athenian allies who owned foreign coins demonstrates that the Athenian mint acquired raw silver and foreign silver coins from a range of private individuals and polities.

Recent metallurgic studies suggest the Archaic mints rarely mixed silver from multiple sources in the same coins (Stos-Gale and Davis, *art. cit.*, p. 98). Cohesive batches of metal

were acquired from different suppliers but used sequentially, which excludes the melting of random coins reaching the island through trade as its main source of bullion. However, Aegina controlled neither a mining district nor allied cities, and its coinage nevertheless rose to early preeminence in the Archaic period (J. Kroll, 'Minting for Export: Athens, Aegina and Others', in *Nomisma. La circulation monétaire dans le monde grec antique. Actes du colloque international, Athènes, 14–17 avril 2010*, Th. Faucher, M.-Chr. Marcellesi, and O. Picard (eds.), BCH suppl. 53, Athens, 2011, p. 27–38). Without the use of coercion that characterized Athens, the only path open to Aegina was to reach agreements with polities or individuals who controlled primary sources of silver. They would have provided high purity metal according to quantities and specifications agreed between the involved parties and received Aeginetan coins in return. Perhaps Aegina charged a fee, perhaps not. The upside for both parties would have been obvious. For the provider of silver, they now owned coins that could be used to purchase the wide array of goods available on the island, while being widely accepted in the Greek world and beyond. They represented a trusted medium of exchange more trusted than raw silver or other local coinages, owing to Aegina's international status. Such a process would have provided Aegina with the coin supply it needed for its *emporion* to function. Since Iberian and Gallic silver is detected as well, some of these agreements must have involved merchants bringing high-quality silver.

Around half of the metal used to strike Aeginetan coins comes from Macedonia and Thrace. These two silver-rich regions started to mint their own coins during the last quarter of the sixth century, and they served both local economic needs and export functions (U. Wartenberg, 'Thraco-Macedonian Bullion Coinage in the Fifth Century B.C.: the Case of Ichnai', in U. Wartenberg and M. Amandry (eds.), *KAIPOΣ. Contributions to Numismatics in Honor of Basil Demetriadi*, New York, 2015, p. 347-364). Coins minted in Archaic Thrace and Macedonia are retrieved in hoards from the Levant, Egypt, Magna Graecia, Asia Minor, but not from Greece proper, unless overstruck (S. -A. Coupar, *The chronology and development of the coinage of Corinth to the Peloponnesian War*, University of Glasgow, PhD Thesis, 2000, p. 55-59). These coins could have served as bullion for the production of coinage, supplementing silver acquired in bulk under the form of ingots or bars. The heavy bullion-style coins minted in Thrace and Macedonia belong to the 470-450 BCE period and as such fall chronologically outside of our argument (Wartenberg 2015, *art. cit.*, p. 357).

### ***Coinage belongs to the field of political economy***

Finley and the 'anthropologic school' are correct in the sense that coinage is a political and legal decision. The term *nomisma* in Greek is unambiguous. At the same time, the Greek cities that adopted coinage did so for economic reasons – they needed the increased wealth that trade brought to them. This is the very definition of political economy – a political decision motivated by economic considerations.

Political fragmentation was central to these diverging monetary paths. Egypt, the Levant, Mesopotamia and Iran "enjoyed" indigenous imperial authorities for most of the period

stretching from the third millennium BCE until Alexander's conquest that took place between 334 and 326 BCE.

These powers enabled the establishment of imperial legal systems that governed the territories under their rule. The phrase "law of the king" is a common formula found in Achaemenid-era documents, particularly in the context of economic transactions. It goes as far as defining the acceptable types of metal fineness for various economic and fiscal transactions and drew clear inspiration from the empires that had ruled the region prior to the Persian expansion. Through the use of sealed bags of Hacksilber, the intervention of administrative and professional experts and the application of the law over vast territorial expanses, the authorities of the ancient Near East managed to create a versatile monetary system that fulfilled its functions without the use of coins. Obviously, fraud did occur. However, it did not escalate to the point where the system would have become nonfunctional. The high level of silver purity in the hoards retrieved from the region, along with the widespread presence of silver in the documentation, demonstrates that the system successfully achieved its overall goals.

The Greek-speaking world, from the western colonies to coastal Asia Minor and the Black Sea settlements, experienced a very different environment. The Greek city-states existed in a highly politically fragmented environment, each city fighting, allying, trading, and competing with its small neighbors. Without the presence of a central authority that could control and regulate the purity of the precious metals that circulated, the Greek cities could not rely on the consistent quality of the silver that reached them from multiple sources. At the same time, they could hardly pursue originators of adulterated silver, since their legal reach was strictly local. And very few Greek cities had direct access to gold or silver mines. As a result, the level of trust that was required for an unmarked metallic currency to flourish, circulate widely, and be used for daily consumption, could not be implemented.

The authorities ruling over the agoras, the marketplaces of ancient Greece, could have resorted to assaying and melting down any incoming silver, and gather it in sealed bags once their quality had been tested to meet desired requirements, as was the practice in the Near East. However, the chain of transactions taking place in the agora would have led to these bags being opened and their content distributed, spread, and cut to accommodate all sorts of dealings, leading the users to lose traceability. Since the local markets were not immune to continuous and additional influx of debased metal from multiple and probably difficult to identify sources in a very open and politically fragmented geographic environment, good quality silver would be rapidly mixed with metal of lower fineness or even "fourré", *i.e.*, copper coated with silver. Contrary to the practice witnessed in the Near East, authorities would be often powerless if they had wished to reach out to the origin of the fraud, since the limits of their jurisdiction was strictly local. There was no royal judge or governor to appeal to.

Imprinting an official stamp on assayed, weighed, standardized, and locally guaranteed metallic objects raised the bar for fraudsters. It is one thing to carry and use fragments of low-quality silver, and entirely a different venture to establish specialized workshops producing fake coinage. This way, the cities producing silver coins allowed local users to trade and trust what they used, while authorities overseeing the agora remained involved in case of disagreement or fraud. The use of debased silver did not disappear, and “fourré” coins have reached us in significant numbers. However, the rapid success enjoyed by coinage implies that the proportion of fraudulent pieces remained within acceptable limits. In any case, Greek cities enacted legislations dealing with debased and fake coins, and the frequent application of the death penalty shows that they tackled this issue very seriously.

Very interestingly, the first Greek city to develop an international coinage was Aegina, a small city with little to no local resources, but a major emporium. It was perfectly located on the sea routes connecting Egypt and Greece as well as Asia with continental Greece, with no direct access to silver. Recent metallurgical analyses of aeginetic coins have demonstrated that the city acquired its metal by large batches rather than waiting for traders to bring it piecemeal to its markets and melting the proceeds. This shows that the authorities entered into specific agreements with the polities that controlled silver mines, notably from Thrace and Macedonia. One could think of Aegina as a very ancient Amsterdam: the trade that went through the small island represented a very high multiple of its local wealth, and it depended entirely on the profits of trade to thrive. Like Amsterdam, its riches came from outside, and its currency, characterized by a turtle image, was respected throughout the ancient Mediterranean world. Like Amsterdam, it met its demise at the hands of a more powerful neighbor, Athens in the role of England.

As coinage spread, users enjoyed a reduction of transaction costs compared to the Babylonian or Levantine practice, since coins were counted, while relatively small differences in weight were tolerated. However, the first cities that resorted to coinage might not have perceived its full potential initially. They were dealing with a more basic issue. Greek cities resorted to coinage because they did not have a choice, as they relied more and more on trade to achieve wealth and maintain their political independence, while their political control extended over few dozens of square kilometers more often than not.

It all came down to raising the bar in order to reach the level of trust needed for a monetary economy to operate.

## Bibliography in progress

Austin, M. M. and Pierre Vidal-Naquet. *Economic and Social History of Ancient Greece: an Introduction*. University of California Press, 1977.

Bresson, Alain. *The Making of the Ancient Greek Economy. Institutions, Markets, and Growth in the City-States*. Translated by Steven Randall. Princeton University Press, 2016.

Cooke, R. M. "Speculations on the Origins of Coinage." *Historia* 7, 1958, 257-262.

Kraay, Colin M. *Archaic and Classical Greek Coins*. University of California Press, 1976.

Finley, Moses. *The Ancient Economy*, updated edition. University of California Press, 1999 (1973).

Hochard, Pierre-Olivier. "L'apparition de la monnaie frappée: invention ou innovation? Bilan historiographique et enjeux historiques," In *De la drachme au bitcoin. La monnaie, une invention en perpétuel renouvellement*, directed by Catherine Grandjean. Dialogues d'histoire ancienne Supplément 20, 2020. 15-34. 10.3917/dha.hs20.0015.

Howgego, Christopher. *Ancient History from Coins*. Routledge, 1995.

Keynes, John Maynard. *A Treatise on Money*, vol. 1, *The Pure Theory of Money*. Cambridge University Press, 1930. <http://tankona.free.fr/keynescw5.pdf>

Kim, Henry S. "Archaic Coinage as Evidence for the Use of Money", In *Money and its Uses in the Ancient World*, edited by Andrew Meadows and Kirsty Shipton. Oxford University Press 2001: 7-21.

Kurke, Leslie. "Herodotus and the language of metals." *Helios*, 22, no. 1 (1995), 36-64.

Le Rider, Georges. *La naissance de la monnaie. Pratiques monétaires de l'Orient ancien*. Presses Universitaires de France, 2001.

Martin, Thomas R. "Why Did the Greek "Polis" Originally Need Coins?" *Historia: Zeitschrift für Alte Geschichte* 45, no 3 (1996), 257-283.

Pappa, Eleftheria. *Early Iron Age exchange in the West: Phoenicians in the Mediterranean and the Atlantic* (Ancient Near Eastern Studies Supplement Series 43). Peeters, 2013.

Schaps, David. M. *The Invention of Coinage and the Monetization of Ancient Greece*. The University of Michigan Press, 2004.

Schaps, David M. “War and Peace, Imitation and Innovation, Backwardness and Development: The Beginnings of Coinage in Ancient Greece and Lydia” In *Explaining Monetary and Financial Innovation. A Historical Analysis*, edited by Peter Bernholz and Rolan Vaubel. Springer, 2014, 31-52. [https://doi.org/10.1007/978-3-319-06109-2\\_3](https://doi.org/10.1007/978-3-319-06109-2_3)

Seaford, Richard. *Money and the Early Greek Mind. Homer, Philosophy, Tragedy*. Cambridge University Press, 2004.

Smith, Adam. *An Inquiry into the Nature and Causes of The Wealth of Nations*. W. Strahan and T. Cadell, 1776. Accessed through The Electronic Classics Series, The Pennsylvania State University, Copyright 2005, <https://et.pixel-online.org/files/etranslation/original/The%20Wealth%20of%20Nations.pdf>.

Vargyas, Péter. “Silver and Money in Achaemenid and Hellenistic Babylonia”, In *Assyriologica et semitica: Festschrift für Joachim Oelsner anlässlich seines 65. Geburtstages am 18. Februar 1997*, edited by Joachim Marzahn and Hans Neumann with the cooperation of Andreas Fuchs. Ugarit Verlag, 2000, 513-21.

Von Reden, Sita. “Money, Law and Exchange: Coinage in the Greek Polis.” *Journal of Hellenic Studies* 117 (1997): 154-176. <https://doi.org/10.2307/632554>.