

Metal money before coinage in the Aegean, ca. 1400–600 BC

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Aegean, Bronze Age, Iron Age, gold, coinage, Hacksilber

The importance of weighed metal money (Hacksilber and other metals) not only in the Near East, but also in the whole Mediterranean, before the advent of coinage, is only beginning to be fully recognised. There are still many ongoing discussions as to the characteristics, functions and the level of circulation of this kind of money, as well as its relations to other systems of measuring and exchanging wealth, including coinage. This paper concentrates on the Aegean, but by placing it in its Mediterranean context I try to approach some wider economic and monetary dynamics. It is argued here (1) that weighed gold money played a role in the Mycenaean economy outside the palatial sphere, notably in the exchanges with the Near East and Egypt, and that this was a part of the wealth of Mycenaean elites; (2) that gold continued to play a role in the Iron Age down to the 8th century at least; (3) that the introduction of silver as money, pre-dates the introduction of coinage and played an instrumental role in shaping the new economies of emerging city-states, notably slavery; (4) that all these developments can be paralleled with processes known in the Near East and Egypt. The invention of coinage, far from being an economic, social and cultural revolution, is seen here in a continuum with an already widely monetised economy.

Metallgeld vor der Münzverwendung in der Ägäis, ca. 1400-600 v. Chr.

Ägäis, Bronzezeit, Eisenzeit, Gold, Münzgeld, Hacksilber

Die Bedeutung von gewogenem Metallgeld (Hacksilber und andere Metalle) vor dem Aufkommen von Münzgeld wird allmählich nicht nur für den Vorderen Orient, sondern für den gesamten Mittelmeerraum voll anerkannt. Viele Fragen zu dem Charakter, den Funktionen und dem Umfang des Umlaufs dieser Art von Geld sowie hinsichtlich seiner Beziehungen zu anderen Mess- und Austauschsystemen von materiellem Wert, einschließlich der Münzprägung, werden zurzeit noch diskutiert. Der Schwerpunkt dieses Beitrags liegt auf der Ägäis, aber indem wir diese Region in ihren mediterranen Kontext stellen, versuchen wir, die umfassenderen wirtschaftlichen und monetären Dynamiken zu fassen. Es wird argumentiert, (1) dass gewogenes Goldgeld in der mykenischen Wirtschaft außerhalb des zum Palast gehörigen Bereichs von Belang war, insbesondere im Austausch mit dem Vorderen Orient und Ägypten, und dass dieser einen Teil des Reichtums der mykenischen Eliten erklärt, (2) dass Gold auch in der Eisenzeit bis mindestens ins 8. Jahrhundert v. Chr. bedeutend war, (3) dass die Einführung von Silber als Geld vor der Einführung der Münzprägung erfolgte und eine entscheidende Rolle bei der Gestaltung der neuen Volkswirtschaften der aufstrebenden Stadtstaaten, vornehmlich bei der Sklaverei, spielte und schließlich (4) dass all dies mit Entwicklungen im Vorderen Orient und in Ägypten parallelisiert werden kann. Die Erfindung des Münzwesens war unseres Erachtens weit davon entfernt, eine wirtschaftliche, soziale und kulturelle Revolution gewesen zu sein, stattdessen ist sie in dem Kontinuum einer bereits weitgehend monetarisierten Wirtschaft einzuordnen und zu verstehen.

Recent research has made it imperative to go back to the fundamental distinction between money and coinage, to be found in almost every handbook on economics. Coins are money (at least in their normal use) but they are not the only form for money which should be expected by archaeologists and historians. This paper will try to illustrate this point with material from the Aegean through the Late Bronze Age, Iron Age and Archaic period (*ca.* 1600 to *ca.* 500 BC) and place it in its Mediterranean context. The scarcity of the documentation contrasts with the available material from, for instance, the Levant and Mesopotamia. Hence, it is not easy to present a synthesis – or better a global view – on money in all its forms from the Late Bronze Age to the beginning of the Archaic period in the Greek world. Another factor of difficulty in drawing a general view of the question is the dynamism of very recent research which constantly changes the picture, even if all new data and analyses are directed in one and the same direction: the importance of weighed, non-coined money for the societies of the Late Bronze Age and later.

1. Preliminary considerations: Money and coinage

Until recently, as far as the history of monetary means in the Aegean is concerned, the following points were considered quite obvious: the invention of coinage was viewed as a complete revolution, and quite often, explicitly or not, it was confused with the invention of money. Therefore, all societies pre-dating *c.* 580 BC, the traditional view for the beginning of coinage in Lydia and Ionia (LE RIDER 2001), now revised to the late 7th century by work on the Artemision contexts at Ephesos (KERSCHNER/KONUK 2020) were considered pre-monetary, and it was assumed that the rapid spread of silver coinage in the last third of the 6th century was an economic, social and even cultural revolution. It was also assumed that these pre-monetary societies were using systems of direct equivalencies between goods, as for instance oxen and other objects in Homeric poems, double axes (*pelekeis*) in some regions where Archaic inscriptions were referring to them as late as the 5th century (Crete), and complex systems of equivalencies between grain, wine, wool and other products in the Mycenaean palace-administered economy (PARISE 2000; NICOLET-PIERRE 2002, 83-108).

The importance of weighed silver as money in Archaic Greece, however, has been recognised since some 20 years, thanks to a series of contributions by John KROLL (among others 1998; 2001; 2008; 2011), followed up by Raymond DESCAT (2001, 2006b; see below for details) in his reflections on the economic history of Archaic Greece. In the conclusions of a special issue of the *Revue Numismatique*, Jean ANDREAU (2001) argued that historians

and archaeologists should abandon the notions of pre-money or proto-money, which is often a correlate of the semi-conscious identification of money with coinage. Andreau argues that these notions lack any precise definition and that an approach through the functions of money (measure of value, storage of value, mean of payment) would be more precise. As a matter of fact, even if the distinction between money and coinage is widely acknowledged, particularly in France where an article by Edouard WILL (1954) has made it very clear, we tend to consider everything before coinage as pre- or proto-money, and consider pre-coinage monetary forms as something incomplete. Teleology is never very far away in those matters. To sum up quite roughly, Andreau was also arguing in favour of a critical approach to binary oppositions, which is particularly pertinent to Archaic Greece. One example is the idea of a gift-giving economy: some authors have criticised the notion that gift-giving functioned as the main element defining the whole economy of Early Archaic Greece, and that it progressively dissolved in favour of more abstract, less personal, forms of exchange and accounting (see the review article by DE CALLATAÏ 2001; ZURBACH 2010). On that point, we will only underline that gift-giving also needs accounting, and that it is not *per se* hostile to monetary means. A more diversified view of the Archaic economy in the Aegean is based on the notion of spheres of exchange, defined by different tools of evaluation, storage of value and payment; a clear case often seen in ethnography are the wedding gifts (DESCAT 2001; 2006b, with literature).

Two observations have to be added here. The first is that monetary questions, as others, cannot be correctly analysed if they are seen only in an isolated Greek world. It is essential to understand that the movement of research we just described is part of a wider tendency which places weighed metal money at the heart of the monetary and economic history of the Near East, the Mediterranean and Europe. It is part of a general movement in research, from Iberia and Europe (GARCÍA-BELLIDO *et al.* 2011; BRANDHERM *et al.* 2018; POIGT 2018; 2020) to the Near East (JURSA 2010 for Babylonia in the 6th century; GASPA 2016 for the Neo-Assyrian empire; VARGYAS 2002/10 and AGUT 2014 on Egypt, *etc.*) and of course the Levant, on which recent work, notably by HEIJMANS (2018; in press), ESHEL (2014) and ESHEL *et al.* (2018), give a most welcome update.

A second important observation is that metal used as money while defined only by quality and weight, not as coinage, has been well known to earlier economists and economic historians of diverse theoretical backgrounds. Let us quote two passages from John M. KEYNES' *A Treatise on Money* (1930, I, 12; see LEROUXEL 2015, 118).

“When the kings of Lydia first struck coins, it may have been as a convenient certificate of fineness and weight, or a mere act of ostentation appropri-

ate to the offsprings of Croesus and the neighbours of Midas. The stamping of pieces of metal with a trade-mark was just a piece of local vanity, patriotism or advertisement, with no far-reaching importance” (...). “It was not necessary, therefore, that talents or shekels should be minted [*i. e.* coined]; it was sufficient that these units should be state-created in the sense that it was the state which defined (with the right to vary its definition from time to time) what weight and fineness of silver would, in the eyes of the law, satisfy a debt or a customary payment expressed in talents or in shekels of silver”.

Coinage is therefore in Keynes’ perspective certainly not a fundamental step; the important steps he identifies in the global history of money are the introduction of metal money, and then the introduction of what Keynes calls representative money, what we call fiduciary money (for him, paper money with no material value at all). Fiduciary money is a somewhat complex notion, since coinage is in fact always fiduciary, from the very moment that it introduces a distinction between material and nominal value. This point, however, lies beyond the scope of this article and is more related to the bronze coinages in Greece (GRANDJEAN/MOUSTAKA 2013; esp. DESCAT 2013, 187).

Economists and sociologists from such different orientations as JEVONS (1875, chap. 4-6) and SIMIAND (1934) agree on the fact that weighed metal money is a fundamental step in the long-term history of money, perhaps more important than the invention of coinage. Furthermore, GRAEBER (2011, chap. 8) has also given all due place to weighed, non-coined metal money in his global history of debt. Already ARISTOTLE (*Politics* 1257a 35-41) did fully recognise the importance of weighed metal money:

“The various necessities of life are not easily carried about, and hence men agreed to give and receive in their mutual exchanges something which was intrinsically useful but also easy to transmit for the purposes of life, for example, iron, silver, and the like. Of this the value was at first measured simply by size and weight (*μεγέθει καὶ σταθμῶ*), but in process of time they put a stamp upon it, to save the trouble of weighing and to mark the value.”

This passage represents only a short observation in Aristotle’s theory of money, and is rarely commented upon, or only in a general perspective on the role of metallic value in his conception of money, as opposed to Plato’s chartalism (SCHUM-PETER 1954, 59-61; MEIKLE 1995, 87-109). One may ask whether this idea stems from a pure theoretical construction on the evolution of monetary forms, or from some historical sources or contemporary evidence available to Aristotle. It is difficult to prove that Aristotle had an idea of the use of weighed metal money in ancient times, but it remains probable.

How can one integrate these new perspectives into our reconstruction of the history of Antiquity?

2. Three stages in Greek monetary, pre-coinage economy

As a specialist of the Greek world, I will concentrate here on three stages in the pre-coinage monetary systems of the Aegean.

Mycenaean gold as money

The Mycenaean economy has long been considered a quite centralised palace-controlled economy, known through administrative texts. This organisation, as we know, has close parallels in the Late Bronze Age Eastern Mediterranean, from Anatolia to Syria and Egypt, and there are numerous works underlining the pertinence of parallel features, Ugarit being the most widely used point of comparison; others may well be as promising, notably Hittite Anatolia. It is now, however, clear that the palace does not organise nor register the entire economy, and we tend nowadays to underline the role of rural communities, semi-independent merchants, *etc.* At the time of MOSES FINLEY’s (1957) and KARL POLANYI’s (1960) first attempts at a global interpretation of the Mycenaean economy based on recently deciphered Linear B texts, most of them from destruction levels of c. 1200, it seemed clear that this centralised economy worked in a completely non-monetary way, with equivalencies being established directly between goods, in kind (for a general view on Mycenaean economy and the place of the palace, KILLEN 1985). It was assumed that this was sufficient to cope with the necessities of a redistributive economy, without market exchange.

There was, for sure, an elaborate system of direct equivalencies connecting a wide range of commodities, whose value was measured in kind (detailed view of the question in SACCONI 2005). The bulk of Linear B texts being economic and fiscal, a thorough analysis of the variations in fiscal obligations, for instance, can reveal some aspects of the underlying system of accounting in kind. This has been done in a most detailed and convincing way by PIA DE FIDIO in her book on *I dosmoi pilii a Poseidone* (1977). On the basis of fiscal texts with contributions in many different items for each contributor, she arrives at the following equation, expressed with the conventional transcription for Mycenaean ideograms: HORD 24 = NI 12 = FAR 4 = VIN 4 = OLE 2 = ME+RI 1, which means: 24 units of barley = 12 units of figs = 4 units of flour = 4 units of wine = 2 units of oil = 1 unit of honey (DE FIDIO 1977, 110). None of these commodities seems to assume the functions of a universal equivalent. Two texts from Pylos in Messenia show, however, that this kind of equivalence did not only function as a tool for the fiscal administration but was also a mean of payment. Tablets PY An 35 and PY Un 443 show quantities of alum being acquired through payment with wool, goats, skins, wine, and figs in the first case, wool and skins in the second. These texts are,

again, purely administrative, not contracts or anything bilateral. They register only the quantities of goods given in exchange for alum, not the quantity of alum itself; their objective is to register what has been taken out of palatial storage rooms, and in this sense, they are documents internal to the palace. Only for the sake of clarity did the scribe explicitly state that this was “for the acquisition of alum”. This point also makes clear that the alum was really paid for, in both cases, through these groups of quite diverse items. The transaction almost certainly included someone outside the palace as provider of alum, a product which may come from far away, and almost certainly outside the palace’s territory.

Of course, this has not prevented Mycenologists from looking for some kind of metal money. When Mycenologists address the question of money, they normally think of the use of weighed silver in the Near East. A wealth of cuneiform texts, like the Codex Hammurabi, the other law codes from the 2nd millennium, the state archives from Ebla and Ur (3rd millennium BC), the merchant archives from Kültepe Karum Kanesh (early 2nd millennium BC) (DERCKSEN this volume) or private archives from

Neo-Babylonian times, provide extensive evidence that silver was used as money. The problem is that silver is almost absent from Linear B texts: *a-ku-ro* ἄργυρος is attested only one time, as an ornament for a chariot wheel (PY Sa 287). There is also a possibility that a new ideogram, recently recognised as different from the long-known ideogram for gold, might represent the commodity “silver”. If this hypothesis is right, and I think it is, then some of the metal vases registered as offerings in a Pylian tablet (PY Tn 316) are made of silver (see below on the question of the two variants of ideogram *141). But that is all: no *Hacksilber* can be identified in Linear B texts. But the situation may be different if we look for *Hackgold*.

I have argued elsewhere that the search for weighed silver as money has prevented us to recognise the use of weighed gold as money (ZURBACH 2017b; 2018a). Let us summarise the argument. The essential source on this matter is the Pylian tablet PY Jo 438, which records contributions in gold from a series of persons. **The text and an attempt at a translation see yellow box .**

(only remaining fragment of the introduction) the *ko-re-te* [districts chiefs]

(list of contributors) *te-ko*[and *e-re-ta*[[proper names? or professional groups, builders and rowers?] (should give) M 1 and N 1 of gold; one *po-ro-ko-re-te* [district chief in second] (should give) N 2; Dorikhaos the *mo-ro-qa* [title: he who has land?] (should give) N 1; Lyros the *mo-ro-qa* (should give) [probably] N 1; Nedwatas and Echemedes [known as military commanders] (should give) [quantities lost]; the *ko-re-te* for Lousoi (should give) P 4 [or more]; the *ko-re-te* for Sphagianes(should give) P 4 [or more]; the *ko-re-te* for Aphauia (should give) P 5; the *ko-re-te* for Charadros (should give) P 5; [lines 13-17 are difficult; one *ko-re-te* on l. 13, one *mo-ro-qa* on l. 17]; Alkhawon (should give) P 3; the *po-ro-ko-re-te* for Helos (should give) P 3; Aggelos the *qa-si-re-u* (should give) P 3; *te-po-se-u*, the *ko-re-te* for *ti-nwa-ta*, (should give) N 1; Poikilops [known as a military officer] (should give) N 1; *au-ke-wa* [a high functionary] (should give) N 1; the *ko-re-te* for *ti-mi-ti-ja* (should give) P 6; *i-te-re-wa* [place-name] (should give) P 6; *pi*-*82 [place-name] (should give) P 6; the *ko-re-te* for *e-ra-te-re-wa* (should give) P 6; the *ko-re-te* for *a-ke-re-wa* (should give) P 5. (On the left side) *po-so-ri-jo* the *po-ro-du-ma* [an official] (should give) [lost quantity]; *-jo* the *a-to-mo* [unclear denomination] (should give) P 3.

This text probably had a heading, some introductory phrase stating the purpose of the operation, but it is lost, so that we will never know why the palace wanted to assemble these amounts of gold. We are left with a list of persons, designated either through their proper name, through a title or both. The sociological complexity of this group has been shown by CHADWICK (1989/99) in his

PY Jo 438

.0]
.1]ko-re-te
.2 te-ko[]AUR M 1
.3 e-re-ta[]AUR N 1
.4 po-ro-ko-re[-te]AUR N 2
.5 do-ri-ka-o , mo-ro[-qa	AUR]N 1
.6 ru-ro , mo-ro-qa	AUR [] 1
.7 ne-da-wa-ta	AUR [qs]v.
.8 e-ke-me-de	AUR N[qs]v.
.9 ro-]u-so , ko-re-te	AUR P L 4[]v.
.10 pa-ki-ja-ni-ja[ko-]re-te[]AUR P 4[]v.
.11 a-pu ₂ -ja , ko-re-te[]AUR P 5
.12 ka-ra-do-ro , ko-re-te[]AUR P 5
.13]vest.[]ko-re-te[]AUR P 5
.14]ki[]	AUR N 1
.15]ma	AUR P 6
.16 wo-no[]ma	AUR N 1
.17 qo-wo[]mo-ro[-qa]	AUR N 1
.18 a-ka-wo	AUR P 3
.19 e-re-e , po-ro-ko-re-te	AUR P 3
.20 a-ke-ro , qa-si-re-u	AUR P 3
.21 te-po-se-u , ti-nwa-si-jo ko-re-te	AUR N 1
.22 po-ki-ro-qo	AUR N 1
.23 au-ke-wa	AUR N 1
.24 ti-mi-ti-ja , ko-re-te	AUR P 6
.25 i-te-re-wa	AUR P 6
.26 pi-*82	AUR P 6
.27 e-ra-te-re-wa-o , ko-re-te	AUR P 6
.28 a-ke-re-wa , ko-re-te	AUR P 5[]v.
.29	
lat. sin. po-so-ri-jo po[-ro-]da-ma AUR P [] × []-jo a-to-mo AUR P 3 ×	

commentary on this important text. Most of the people mentioned here are already known from other texts. It is a mixture of persons belonging to the central palatial elite, like military officers or high functionaries from the political centre, local officials (district heads, the *ko-re-te* and *po-ro-ko-re-te*) and even one *qa-si-re-u*. This last title, the predecessor of historical Greek βασιλεύς, is used in Mycenaean times for a category of notables of local importance, linked to local communities and external to the palatial hierarchy (CARLIER 1984; new discussion and proposals in MÜLLER 2015). The toponyms sometimes linked to these titles are organized in a way that conforms broadly to the division of the kingdom in two provinces, but does not follow the customary order of districts we find in other fiscal texts. This text lacks the systematic character that one would expect from fiscal documents and therefore cannot be considered as “canonical”: it lists some of the 16 districts but not all, some of the *ko-re-te* but not all, only a few military officers, and so on. In the absence of any explicit element in the text, the nature, parameters and goals of this levy remain unclear. CHADWICK (1998/99) made the guess that such a levy in gold, apparently exceptional as it is, could be made to pay for mercenaries, which are attested elsewhere in Pylian texts. There are some ways to link this list to the presence of mercenaries, not least the mention of military officers and the repartition of place-names.

What is certain about this list is its object: everyone has to deliver a given quantity of gold, which must be raw metal, ingots, or scrap material, since it is designated through the ideogram for gold. If this text was about a given item, the scribe would quite certainly have used another ideogram (for a vase, for instance), possibly in ligature or complemented through the ideogram for gold. This text is about the metal itself, not about objects in gold. The quantities are quite diverse.

Leaving aside the incomplete numbers, they are as follows: a particular contribution amounts to M 1 (a double mina, ca. 1 kg); 9 to N 1 (some 250 g) and 1 to N 2 (some 500 g); 5 to P 6, 3 to P 5, 4 to P 3 (with P = ca. 20.8 g; P 3 = ca. 62.4 g; P 5 = ca. 104 g; P 6 = ca. 124.8 g). (I use here the conventional values for the conversion of Mycenaean measures, which are only an approximation: ALBERTI 2003; 2016, 702-706). The document accounts for important quantities: roughly 1 kg (M 1) or 0.5 kg (N 2) of gold are, in fact, no small change. But the values are too diverse to reveal any form of standardisation. The rules along which the level of contribution is calculated for every contributor remain obscure.

A last point to be discussed here is the value of the ideogram. It is Linear B sign *141, usually transcribed as AUR for *aurum*, gold. It has long been assumed that Linear B had ideograms for bronze and gold, but not for silver. A recent re-examination by GODART (2009, 112-114) of a complex list of of-

ferings from Pylos (PY Tn 316) has led him to distinguish two variants of sign *141, which he called *141 and *141bis. He argues convincingly that the two variants are so different, and so clearly distinguished in one and the same text, that they probably have different significations. In this understanding we would have two ideograms – one of for gold, and the other for silver – but the precise attribution of each ideogram would remain open (in that sense FRANCESCHETTI 2012, 257). However, GODART (2012, 114-115) interprets the sign *141bis (the rarest of the two variants) in PY Tn 316 to stand for silver, and *141, the usual form, to stand for gold because the offerings appear to be organised in a hierarchical order, beginning with the more precious gold and continuing with the less valuable silver. I therefore consider it the best hypothesis that *141, the sign used also in PY Jo 438, means gold, not silver.

Back to money: Chadwick, as we saw, suggested that gold could be used to pay mercenaries but did not call it money. The picture which emerges from this text, nevertheless, is that of diverse elite social groups being taxed in an informal way (meaning: a somewhat unusual way, not following the usual rules of the fiscal administration) and constrained to deliver a considerable amount of gold. A minimal evaluation of the total amount of gold expected here, taking into account the missing numerals, may be a little bit more than 5.75 kg. Whatever one thinks of the hypothesis based on mercenaries, the unusual nature of the levy suggests that it is made for some practical use, not for storage in the palace: it would circulate. On the other side, why do these persons have gold at home, unless it is something that one would be interested in storing? It is clearly not a regular item of interest for the palace, and its presence in the hands of some privileged social groups may be revealed in this text precisely because of its exceptionality: for this time, the palace needs gold, perhaps for its mercenaries, when it usually uses goats and wool to pay for alum.

Perhaps it is not without pertinence to add that on the Uluburun shipwreck, only rare pieces of silver came to light, but a collection of ‘scrap gold’ was found (PULAK 1988, 26-28). Is there a possibility that semi-independent merchants of *tamkaru* type would use gold, as did some parts of the Pylian elite (on the *tamkaru*, merchants or palace officers or both, see GRASLIN 2009, 381-438)?

As far as the palatial Late Bronze Age is concerned I would therefore argue, on the basis of some Linear B texts and a still limited archaeological material, that the equivalency systems used by the palace in internal accounting, fiscality, and exchange (see the texts on alum mentioned earlier) was indeed a way to ensure accounting and payments on the administered side of the economy. In the meantime, I would argue that a weighed gold money was circulating among the richer groups of society, such as local notables and also palatial elites

in their private activity, and that this gold money would be well suited to ensure the circulation of payments in the international economy with Egypt and the East.

A last one Linear B text should be mentioned here. Tablet PY Ae 303 registers 14 or more women slaves ‘because of the sacred gold’. **See yellow box below.**

They are usually considered guards of the sanctuary treasure, and the causal relation (*e-ne-ka* ‘because of’) is taken to indicate the cause of their presence at Pylos. I would take this as the cause of their very status as slaves, and the whole text as a registration of the change in status of debtors after default, meaning that these women may be slaves precisely because they did not pay back their loan from the sanctuary. There would be nothing unusual in seeing a sanctuary functioning as a credit institution (for instance CHARPIN 2005 for Babylonia, CHANKOWSKI 2005 for the Greek world, and all other articles assembled in *Topoi* 12/13, 2005), and the possibility of debt slavery or servitude for defaulting debtors would be coherent with the important numbers of ‘slaves of the deity’ registered in cadastral texts on land linked to the sanctuary. This reading of the text would shed more light on weighed gold in Mycenaean Pylos. It is not, however, essential to the argument for the existence of a weighed gold money, for which Jo 438 appears sufficient.

It is certainly pertinent to go back to the similarity of economic practices around the Eastern Mediterranean. The reference to Near Eastern realities may have been misleading when Mycenologists were looking for *Hacksilber*, but a closer look leads in a different direction. In the Late Bronze Age, as opposed to earlier and later periods, some evidence does hint at the use of gold as a standard of value and as circulating *Hackgold*. In Egypt, gold seems well represented in the Ramesside hoards from the Cairo Museum (listed in a short article by VARGYAS 2002/10) and as a means of payment and standard of value (GARDINER 1941-1952, II, 61). The clearest case is Babylonia, where in Kassite times gold had replaced silver (as shown by KLEBER 2016). Last but not least, this seems to be the case also in the Southern Levant, under Egyptian control at the time (I thank Tzilla Eshel for pointing this out to me during the Weights and Money workshop; one example of a *Hackgold* hoard is in

GOLANI/GALILI 2015). This would be a perfect period for the loan of the very word for ‘gold’ by the speakers of Greek from one Semitic language (akk. *ḫurāṣu*, ug. *ḫrṣ*, heb. *ḥārūs*, phoen. *ḫrṣ* ‘gold’ > gr. χρυσός, myc. *ku-ru-so*), and also for the loan of the word for ‘mina’, coming as well from the East, in the context of reciprocal knowledge of weighing systems and measures between the Aegean, Egypt and the Levant (ALBERTI 2003).

The Early Iron Age Aegean: Gold maintained?

During the Early Iron Age, gold did probably retain this role. The Eretria hoard, dated to the end of the Geometric period (last quarter of the 8th century BC), is exactly what one would expect of *Hackgold*, if compared with the many *Hacksilber* hoards of the Levant. Its composition, with pieces of raw gold bearing traces of cutting and fragments of pieces of jewellery, is reminiscent of the composition of the gold hoard from the Southern Levant just mentioned (GOLANI/GALILI 2015). This hoard is an essential piece of the story of monetary means in the Aegean (THEMELIS 1983; KROLL 2001; 2011; HEIJMANS in press). A find from a tomb near Knossos, at Khaniale Tekke, should be added here; it has been interpreted as the tomb of a Levantine goldsmith, but this assemblage may well be *Hackgold*: it comprises five gold bars, three gold dumps with an average weight of 18.68 g; a silver dump of 7.25 g, and an electrum dump of 15.53 g. It is dated to Protogeometric B, in Crete the central part of the 9th century BC (HUTCHINSON/BOARDMAN 1954; BOARDMAN 1976; DOMÍNGUEZ MONEDERO 2011).

In the Homeric epics, as is well known, oxen are the most frequently cited standard of value. However, the mentions of goods in storage (*keimelia*) in the aristocrats’ treasures typically contain metals, bronze, iron and gold. On the gold talents mentioned in the epics, VAN WEES (2013, 111 with n. 18 for the occurrences) has recently offered a synthetic view. These mentions are difficult to interpret: they are probably not talents of 26-30 kg but much lighter than that (a daric after HERON, *Geometrica* 23.58), perhaps small circular plates, of the type found in the much earlier Grave Circle A at Mycenae, as proposed by NICOLET-PIERRE (2006). They are used at least as storage of value. In any case, whatever their material forms, small pieces of gold seem to circulate in the Homeric epics. As with Linear B, it may be supposed that a general reference to gold as a metal indicates that it has the form of ingots or small unworked pieces, since a more elaborate form would have deserved a mention. The problem with gold in Homer is the exact function it may assume. Even if one thinks that the predominance of oxen as standard of value may be due to the aristocratic perspective of the poems, the fact is that talents of gold go along with other gifts and do not have any particular status. There is no trace of gold being used as means of payment. On

PY Ae 303

.a i-je-ro-jo
 pu-ro , i-je-re-ja , do-e-ra , e-ne-ka , ku-ru-so-jo MUL 14[
 .a i-je-ro-jo on [[e-ne-ka ku-ru-so-jo i-je-ro-jo]]
 ‘At Pylos. Slaves of the priestess, because of the sacred gold: 14+ women.’

the contrary, in a well-known scene of the *Iliad*, the Achaeans give bronze, iron, skins, oxen and slaves in exchange for Lemnian wine (HOMER, *Iliad* VII 473-475). So, the main question here the exact function of gold: storage? Exchange? Measure? (Again, to classify it as 'pre-money' is not enough and does not give an answer). The ways in which we frame the role of gold among many other means of payment and evaluation in the Bronze Age affect the ways in which we understand the appearance of silver in the following period.

Silver in Archaic Greece

The hypothesis that the Early Archaic world of the 7th and early 6th centuries BC saw the expansion of weighed silver as money from the Near East towards most of the Eastern Mediterranean, including the Aegean, has been based on essentially three elements: (1) the presence of evaluations in silver in what is left of Solon's laws (KROLL 1998); (2) the fragment of an accounting text from the Ephesian Artemision, *I.Ephesos* 1 (see below); and (3) the presence of *Hacksilber* in some hoards of the late 6th or early 5th century. The idea that silver bullion was in current use as money from c. 650 BC onwards in the Aegean has met criticisms and scepticism (summarised in ZURBACH 2018a, 3; see the intermediate position expressed by FISCHER-BOSSERT 2018, 17). However, a review of the evidence shows that it is highly probable. On Solon's fragments, the main criticism has been expressed by DAVIS (2012), but it has to be noted that Davis agrees with the existence of weighed silver money in the 6th century BC, and with the use of barley as a concurrent means of evaluation. The main differences between the approaches by Kroll and Davis lie in the chronology (somewhat later for Davis) and in the use of silver, which was, according to Davis,

essentially used in external exchanges outside the city. On the second point, the text from Ephesos, dated to the late 7th or early 6th century BC, allows definitive conclusions on the use of weighed gold and silver in the accounting of an Archaic sanctuary. KROLL (2020) has recently given a new edition and thorough commentary of this text, which I will quote here only in his new translation. See yellow box below.

It is clear here that we are dealing with a common procedure of weighing non-coined silver and gold. The context is fiscal and deals not only with taxes on commerce, which might implicate that the use of weighed precious metals did go beyond 'international' trade. Here we find both gold and silver, which is unusual and probably correlated to the relatively high date of the text and a regional tendency to use both metals in Asia minor, on which we will have to come back.

The presence of *Hacksilber* in some hoards is certain, but they are all relatively late (after the mid-6th century BC). The absence of hoards of *Hacksilber* analogous to those we know from the Levant is certainly the main problem with the theory that it became widely used in the Aegean early in the Archaic period. However, there is an immense bias in data recovery. Since non-minted silver has become only very recently a topic of interest in Classical archaeology, it is highly likely that older discoveries of *Hacksilber* hoards may have received scarce attention. Not to mention the possibility of illegal looting. It is remarkable that *Hacksilber* survives in hoards where it is mixed with coins, and these hoards are Late Archaic in date (see below on the Colophon and Taranto hoards, ca. 530 and ca. 500 BC respectively), but this does not mean that *Hacksilber* did not pre-date coinage.

I.Ephesos 1

Face A

Forty-[nine] minas of the first (gold) were weighed, gold from the gi[fts]; they were brought from the city. Twenty-five silver minas were brought in (i.e. with) the first gold. From the spear (i.e. martial revenue) six minas of g[old] were weighed. Ten minas of gold from here were weighed. Thirty-three minas of silver were weighed here, silver f[rom the] marit[ime] (revenue).

[From th]is [there re]sult[ed] seventy minas of pur[e gold].

[- - - - -] ten from the salt (revenue)[- -]T[- - - - -]

Face B

[- - - - -] in ad[dition] to the half-min[a, from the s]pea[r (revenue) - - - - -] of [gol]d twenty minas lacking a half-mina. [Thi]rty minas were weig[hed]

[? number of] staters and a sixth from the salt (revenue). [-? -? -? -? -?]. Of thi[s gol]d we obtained fourteen minas. There resulted from this a hundred(?) min[as and a sixt]h; a half-mina and five twelfths of the phiale.

From what we made (i.e. earned or worked), forty minas and eighteen stat[ers were weighed.]

[From the ga]rden thirty minas of silver were brought [- - - - -]

and five

It is not totally correct to say that there is no material evidence for weighed metal before the mid-6th century BC. The new study of the Artemision hoard by KERSCHNER/KONUK (2020) has led to the publication of small lumps of electrum which were deposited with the earliest coins. Additionally, a poorly recorded hoard, probably from late 7th century Berezan, the ancient Borysthenes, at the mouth of the Bug river on the Northern Black Sea, comprised lumps of electron and small pieces of gold jewellery together with early electrum Ionian coins (KARISHKOVSKIJ/LAPIN 1979; not to be mixed with the hoard discovered in 2000, which is at least in part a forgery: KIM 2004). The use of non-coined gold and electrum seems then to be possible in the second half of the 7th century, at least in Ionian contexts. This shows that there is still a lot of work to be done along this line of research, and that *ex nihilo* arguments are not satisfactory.

The problem of the uses of silver in different spheres (in long-distance trade, to pay taxes or as loans, *etc.*) raised by Davis had already been discussed by KROLL (1998, 226) and DESCAT (2006b). Kroll already makes the hypothesis that silver has something to do with the debt crisis among the peasantry which led to a deep social crisis in Athens before Solon. Descat has shown that it is most probably a sign of the opening of different spheres of monetary use which were separated until then. To say it in a somewhat direct manner, the transformation of traditional ways of exploitation of the peasants as *hectemoroï* (share-croppers) into slaves might have been facilitated by a new kind of debt. Hesiod, writing c. 650 BC, speaks of a debt made of loans in kind between neighbours in a village community, without any way for the creditor to seize anything in case the debtor should default. The only punishment is that the one who will not pay back his debts will not find anyone to lend him again some barley – these debts are in kind, typical for a peasant society where one needs some food before the harvest. The debt which characterises the pre-solonian crisis is completely different. It is an unequal relationship between a peasant and a landlord; the typical case mentioned by PSEUDO-ARISTOTLE (*Constitution of the Athenians* II 2) is the *hectemoros* peasant who cannot pay his rents to the landlord, and whose unpaid rents are assimilated to a debt. How has this debt become something so compelling that it might lead the *hectemoros* from unpaid rents to unpaid debts to debt slavery? The answer is most probably that the debt is now expressed in silver, which is much harder to find than barley (see ZURBACH 2013; 2017, 350-357). This would typically be a situation of incomplete monetisation, when landlords used silver in trade and imposed it onto peasants without much access to silver. Davis is surely right in arguing that barley was the main standard at this level, but this does not in my view disqualify Kroll's and Descat's arguments (DAVIS 2012, 154 n. 153, with criticisms to these arguments).

Money functions here as a means of control of the workforce, or even of creating a workforce. Somewhat later, probably in the course of the 6th century BC, as THEOPOMPOS (FGrHist 115 fr. 122) tells in a famous passage, people from Chios were the first to possess slaves brought from outside, and called them *argyrônētoi*, 'bought with silver' (DESCAT 2006b). An instrumental role of weighed silver in the creation and control, through debt, of a workforce of servile or dependent status is to be found also in the three biblical Codes, the dates of which fall in the first half of the 1st millennium BC (LEMAIRE 2015). This is also known for weighed bronze, in Archaic Rome from the reign of Servius onwards (LEROUXEL 2015). In that sense, in explaining the rapid spread of silver coinage through the world of Greek city-states in the second half of the 6th century, it is legitimate to underline that these coinages most probably constitute a follow-up on an already ancient uses of *Hacksilber*, and that both kinds of silver, coined or not, are instrumental in the organisation of Mediterranean slave societies.

There are even closer links between *Hacksilber* and silver coinage. As a matter of fact, they do co-exist in some hoards of the late 6th century. The Taranto 1911 hoard (IGCH 1874) of ca. 500 BC contains some 10 kg of silver, two thirds in ingots and smaller parts of silver; the rest is some 500 coins from Southern Italy, and some 100 from Sicily and the Aegean (KROLL 2008). The most interesting case, however, is the Colophon hoard of c. 530 BC (IGCH I 3; KIM/KROLL 2008). It contains 906 coins, among which 353 twenty-fourths of the Lydio-Persic stater of 10.7 g, that is, coins of 0.43 g; and 552 forty-eighths of the same unit, that is, coins of 0.21 g. The 77 pieces of unminted silver weigh 318 g and are much heavier than the coins. A careful die study has shown that this is only a small part of a huge quantity of coins minted in a short time, perhaps hundreds of thousands in one or two decades. Coinage is used here to facilitate the use of the smallest pieces (KIM/KROLL 2008, 67). It is one structural problem of *Hacksilber*: at some point, after many divisions and cutting-offs, one can no longer test or even weigh efficiently the smallest pieces. At this level, the adoption of coinage may be defined as a transaction cost problem, since the economic agents would have had difficulty in using *Hacksilber* in transactions involving very small amounts. It is the city-state which chooses to suppress this problem by issuing coins. Perhaps, then, in contrast to many things having been written on the origins of coinage, HERODOTUS (*Histories* I. 94) was not so false in attributing the invention to the Lydians because they were *kapeloi*, that is, retail-sellers, the people you find on the agora, which was organised around that time (DESCAT 2006a). Coinage appears in a context where economies are already monetised.

3. Opening questions

This leads to three questions which deserve, if not an answer, at least a careful formulation.

1. The history of silver in the 7th-6th centuries, despite the poor evidence, shows that the shift from one metal to another, particularly from gold to silver, cannot be seen in isolation from the whole system of equivalencies. How can we correlate the changes in function of money to the nature of metal used? Silver may for instance have transformed the relation of debt, replacing the debt known to Hesiod, payable in kind to a neighbour, into a debt opening on debt-slavery. Silver here replaces grain as a means of payment; there seems to always exist a cereal standard: emmer wheat in Egypt (GARDINER 1941-1952, II, 59); barley in Greece (PLUTARCH, *Solon* 23.3, and *supra*). The question, then, remains: how are we to relate changes in the material aspects of money with changes in function, or changes in the relations between different spheres of money use, from trade to debt for instance?
2. There are two material correlates to weighed metal money: hoards of small to medium fragments of metal without any standardisation, and series of standardised objects like the double-axes (*pelekeis*) of some Archaic inscriptions (but did they ever exist as objects?) or the iron spits (KOSTOGLOU 2003). Strictly speaking, the practice of using a weighed money does not lead to series of standardised objects, but to groups of small pieces of various sizes. The relation, and the tension one might suppose, between weighing and standardising is still unclear. Standardisation may even lead to some kind of nominal value.
3. How are we to understand regional differences? 6th-century Tyrrhenian Italy was using bronze weighed money. The Giglio wreck, an Eastern Greek merchant ship which sank around 600 BC off the small island in Etruria, carried a number of small pieces of bronze, not silver. This means that the crew adapted to the local currency (CRISTOFANI 1992/93). Was there a means for a merchant to exchange silver for bronze? Were there professional money-changers, at the origin of the Greek bank (BOGAERT 1968), is linked to the existence of *polis* or *ethnos* coinage. As a matter of fact, when each city-state mints its own coins, it becomes mandatory to have a system of money-changing, and to be able to come with coins from abroad and change them on the spot for the local coins. In that perspective, given that the world of non-coined metal money functions with different metals all over the Mediterranean, it may be asked if some form of money-changing was al-

ready available, notably in the *emporía* which were the nodes of Archaic trade.

Some conclusions

1. In the Near East and Egypt, legal, documentary, and material evidence shows that, since the 3rd millennium BC onwards, by using weighed silver or gold, or in some cases copper, one could pay a tax or a tribute, receive a salary, buy movable goods, animals, slaves, or even land, or do a 'gift' and receive some land as a counter-gift. These bits of metal could be stored, given as a loan, and then upon the debtor's default, cause them to fall into slavery. Non-coined metal functions as a measure of value, a storage of value, and a means of payment. Any definition of money which would remove this from the history of money would be wrong. This is money.
2. This kind of money has its own history, which is only beginning to be written. This is a reminder for Hellenists who too often still see the 'Near East and Egypt', from Sardis to the Indus, as something homogeneous or at least with sufficient coherence to be opposed *en bloc* to the Greek world. The work on monetisation in Assyria and Babylonia mentioned at the beginning of this article shows quite the contrary, as does the study of the Levantine hoards. There are changes in the metal used, concurrent use of different metals, variations in the quantities and qualities of circulating metal(s), and variations in the forms of objects. These are no less interesting than the same questions asked about coinage, like the generalisation of silver coins from 550 BC onwards, or the introduction of bronze coinages in different parts of the ancient world. There could even be links between both sets of questions, in that the early Siceliot bronze coinage could take over a local indigenous tendency to use bronze as weighed money (LAZZARINI 2009; CACCAMO CALTABIANO 2011), or the gold coinages of Asia minor could be the successors to the continued use of weighed gold in that region. The simultaneous use of different metals has to be examined at different levels: as parts of the same monetary system, as in the Ephesos inscription, but also as traces of different regional monetary and economic spheres – see *supra* on the Giglio wreck (ZURBACH 2018b). A quite difficult question, the last I will mention here, is the ultimate explanation for shifting from one metal to another: how are we to understand the consequences of the expansion of silver in Archaic times, and its link to the debt crisis? Was economic change permitted by the new metal and if yes, in what ways?
3. It is important to note that weighed money goes along with many forms of credit. The use

of money may have made credit even more convenient by delaying the payment of goods in those instances in which small change was not available. For example, one could imagine that it was not always easy to pay beer in silver, since the amount of silver required would have been so small that it would have been difficult to weigh out. We know that one consequence of coinage has been the creation of money-changers. One may travel very far with *Hacksilber*, but when payments are to be made with local coins it becomes necessary to have the possibility to change money. This is the origin of the bank in the Greek world. Contrary to a widespread belief, however, it is not the origin of credit (LEROUXEL 2015). The complexity of the credit economy of Mesopotamia has long been recognized. In Greece the transformation of credit is at the very heart of the Archaic crisis. The link between weighed money and credit is essential since it opens questions of strict monetary but also economic importance, like the money supply (the total quantity of money available at a time), since credit creates money.

4. It is therefore an urgent requirement to add this chapter to monetary history. Going back to Keynes: the turning points in monetary history may be recognised as the introduction of metal money. Metallurgy itself did introduce a new kind of movable wealth, and this was much more of a change, and much earlier, than coinage. A consequence is that historians, particularly Hellenists, should avoid considering weighed money as a preface for coinage, something of a ‘not-yet-money’, a predecessor without much importance, which would be naturally replaced by coinage when it would, at last, have been invented.
5. Taking into account the monetary systems based on weighed money leads to a more diverse economic history. We should abandon inherited partitions and separations ‘Greece’ and ‘The Orient’ (‘gift’ and ‘money’). Perhaps most important is the question of frontiers. There is place for a history at the level of the Archaic Mediterranean, notably, when monetisation through *Hacksilber* (gold on some occasions, bronze in Tyrrhenian Italy) led to profound social transformations, censitary political systems, credit with interest and debt-slavery. This is a reminder that money and credit can be formidable tools and multipliers, especially today when economic history has been almost completely reduced to a search for growth (LEROUXEL/ZURBACH 2020). There are also darker sides to money, which played a fundamental role in creating the slave societies of Antiquity.

Abbreviations

- CH *Coin Hoards*. Royal Numismatic Society (London 1975-).
- IGCH *Inventary of Greek Coin Hoards*, edited by M. Thompson, O. Mørkholm, C. Kraay (New York 1973).

Ancient sources

- ARISTOTLE, *Politics*
edited by W. D. Ross, Oxford Classical Texts, 1957;
translation by J. Tricot (Paris 1962).
- HERODOTUS, *Histories*
edited and translated by Ph. E. Legrand (Paris 1932-1954).
- HERON, *Geometrica*
edited by J. L. Heiberg, W. Schmidt (Stuttgart 1976).
- HOMER, *Iliad*
edited and translated by P. Mazon (Paris 1937-1938).
- PLUTARCH, *Solon*
edited and translated by E. Chambry, R. Flacelière, M. Juneaux (Paris 1962).
- PSEUDO-ARISTOTLE, *Constitution of the Athenians*
edited and translated by G. Mathieu, B. Haussoullier (Paris 1922).
- THEOPOMPOS
Fragments, n. 115. In: F. Jacoby, *Die Fragmente der griechischen Historiker* (FGrHist) (Berlin 1923-1929), and in the *New Jacoby*: <https://referenceworks.brillonline.com/entries/brill-s-new-jacoby/theopompos-of-chios-115-a115> (accessed 15.02.2021).

Bibliography

- AGUT 2014
Agut, D., L’orge et l’argent. Usages monétaires à ‘Ayn Manâwir à l’époque perse. *Annales – Histoire, Sciences Sociales* 69, 2014, 75-90.
- ALBERTI 2003
Alberti, M. E., I sistemi ponderali dell’Egeo nell’età del Bronzo. *Studi, storia, pratica e contatti. Annuario della Scuola Archeologica di Atene e delle Missioni Italiane in Oriente* 81, 2003 (2005), 597-640.
- ALBERTI 2016
Alberti, M. E., I sistemi di misura micenei. In: M. del Freo/M. Perna (eds.), *Manuale di Epigrafia Micenea: Introduzione allo Studio dei Testi in Lineare B*, 2 vols. (Padova 2016) 691-723.
- ANDREAU 2001
Andreau, J., La monnaie et les ‘monnaies frappées’. *Conclusions de la table ronde du 15 janvier 2000. Revue Numismatique* 157, 2001, 163-172.
- BOARDMAN 1967
Boardman, J., The Khaniala Tekke Tombs II. *Annual of the British School at Athens* 62, 1967, 57-75.
- BOGAERT 1968
Bogaert, R., *Banques et banquiers dans les cités grecques* (Leiden 1968).

- BRANDHERM *et al.* 2018
Brandherm, D., Heymans, E., Hofman, D. (eds.), *Gifts, Goods and Money: Comparing Currency and Circulation Systems in Past Societies* (Oxford 2018).
- CACCAMO CALTABIANO 2011
Caccamo Caltabiano, M., *Dalla premoneta alla moneta. Tra scelte politiche ed economia in Sicilia e in territorio italoico*. In: GARCÍA-BELLIDO *et al.* 2011, 65-84.
- DE CALLATAÏ 2001
de Callataï, F., *Sur les origines de la monnaie stricto sensu (nomisma). À propos de deux livres récents* (S. von Reden *et L. Kurke*). *Revue Numismatique* 157, 2001, 83-93.
- CARLIER 1984
Carlier, P., *La Royauté en Grèce avant Alexandre. Études et travaux d'histoire romaine, publiés par le Groupe de Recherche d'Histoire Romaine de l'Université des Sciences Humaines de Strasbourg* 6 (Strasbourg 1984).
- CHADWICK 1998/99
Chadwick, J., *Pylian gold and local administration: PYJo 438*. In: J. Bennet/J. M. Driessen (eds.), *A-NA-QO-TA. Studies Presented to J. T. Killen. Minos New Series* 33/34 (Salamanca 1998/99) 31-37.
- CHANKOWSKI 2005
Chankowski, V., *Techniques financières, influences, performances dans les activités bancaires des sanctuaires grecs*. *Topoi* 12/13, 2005, 69-93.
- CHARPIN 2005
Charpin, D., *Les dieux prêteurs dans le Proche-Orient amorrite (c. 2000-1600 av. J.-C.)*. *Topoi* 12/13, 2005, 13-34.
- CRISTOFANI 1992/93
Cristofani, M., *Un naukleros greco-orientale nel Tirreno. Per un'interpretazione del relitto del Giglio*. *Annuario della Scuola Archeologica di Atene e delle Missioni Italiane in Oriente* 70/71, 1992/93, 205-232.
- DAVIS 2012
Davis, G., *Dating the drachmas in Solon's laws*. *Historia* 61, 2012, 127-158.
- DESCAT 2001
Descat, R., *Monnaie multiple et monnaie frappée en Grèce archaïque*. *Revue Numismatique* 157, 2001, 69-81.
- DESCAT 2006a
Descat, R., *Le marché dans l'économie de la Grèce antique*. *Revue de Synthèse* 127, 2006, 253-272.
- DESCAT 2006b
Descat, R., *Argyrônétos: Les transformations de l'échange dans la Grèce archaïque*. In: P. van Alfen (ed.), *Agoronomia: Studies in Money and Exchange Presented to John H. Kroll* (New York 2006) 21-36.
- DESCAT 2013
Descat, R., *Conclusion*. In: C. Grandjean/A. Moustaka, *Aux origines de la monnaie fiduciaire: Traditions métallurgiques et innovations numismatiques*. *Scripta Antiqua* 55 (Bordeaux 2013) 185-187.
- DOMÍNGUEZ MONEDERO 2011
Domínguez Monedero, A. J., *Circulación de dinero y moneda en la Grecia arcaica: El ejemplo de los santuarios*. In: GARCÍA-BELLIDO *et al.* 2011, 43-61.
- ESHEL 2014
Eshel, T., *Four Iron Age Hoards from Northern Israel – Comparative Study* [in Hebrew with English summary] (unpublished M. A. thesis University of Haifa 2014).
- ESHEL *et al.* 2018
Eshel, T., Yahalom-Mack, N., Shalev, S., Tirosh, O., Erel, Y., Gilboa, A., *Four Iron Age silver hoards from southern Phoenicia: From bundles to Hacksilber*. *Bulletin of the American Schools of Oriental Research* 379, 2018, 197-228.
- DE FIDIO 1977
de Fidio, P., *I dosmoi pilii a Poseidon. Una terra sacra di età micenea*. *Incunabula Graeca* 65 (Roma 1977).
- FINLEY 1957
Finley, M. I., *The Mycenaean tablets and economic history*. *The Economic History Review New Series* 10, 1957, 128-141.
- FISCHER-BOSSERT 2018
Fischer-Bossert, W., *Electrum coinage of the 7th century BC*. In: O. Tekin (ed.), *Second International Congress on the History of Money and Numismatics in the Mediterranean World, 5-8 January 2017, Antalya – Proceedings / İkinci Uluslararası Akdeniz Dünyasında Para Tarihi ve Numismatik Kongresi – Bildiriler* (Istanbul 2018) 15-23.
- FRANCESCHETTI 2012
Franceschetti, A., *Gli ideogrammi dei vasi in Lineare B: Analisi dell'ortografia, delle forme e dei materiali*. In: P. Carlier (†)/Ch. de Lamberterie/M. Egetmeyer/N. Guilleux/Fr. Rougemont/J. Zurbach (eds.), *Études Mycéniennes 2010: Actes du XIII^e Colloque International sur les textes égéens*. Sèvres, Paris, Nanterre, 20-23 septembre 2010. *Biblioteca di Pasiphae* 10 (Rome 2012) 243-268.
- GARCÍA-BELLIDO *et al.* 2011
García-Bellido, M. P., Callegarin, L., Jiménez Díez, A. (eds.), *Barter, Money and Coinage in the Ancient Mediterranean, 10th-1st centuries BC*. *Anejos de Archivo Español de Arqueología* 58 (Madrid 2011).
- GARDINER 1941-1952
Gardiner, A. H., *The Wilbour Papyrus*. 4 vols. (Oxford 1941-1952).
- GASPA 2016
Gaspa, S., *Silver circulation and the development of the private economy in the Assyrian empire (9th-7th centuries BCE): Considerations on private investments, prices and prosperity levels of the imperial elite*. In: J.-C. Moreno García (ed.), *Dynamics of Production in the Ancient Near East 1300-500 BC* (Oxford 2016) 125-166.
- GODART 2009
Godart, L., *I die scribe della tavoletta PY Tn 316*. *Pasiphae* 3, 2009, 99-115.
- GOLANI/GALILI 2015
Golani, A., Galili, E., *A Late Bronze Age Canaanite merchant's hoard of gold artifacts and hematite weights from the Yavneh-Yam anchorage, Israel*. *Journal of Ancient Egyptian Interconnections* 7, 2015, 16-29.

- GRAEBER 2011
Graeber, D., *Debt. The First 5000 Years* (New York 2011).
- GRANDJEAN/MOUSTAKA 2013
Grandjean, C., Moustaka, A., *Aux origines de la monnaie fiduciaire: Traditions métallurgiques et innovations numismatiques*. *Scripta Antiqua* 55 (Bordeaux 2013).
- GRASLIN 2009
Graslin, L., *Les échanges à longue distance en Mésopotamie au I^{er} millénaire. Une approche économique* (Paris 2009).
- HEIJMANS 2018
Heijmans, E., *Heads or tails: Metal hoards from the Iron Age Southern Levant*. In: BRANDHERM *et al.* 2018, 85-104.
- HEIJMANS in press
Heijmans, E., *The Origins of Money in the Iron Age Mediterranean World* (Cambridge in press).
- HUTCHINSON/BOARDMAN 1954
Hutchinson, R. W., Boardman, J., *The Khaniala Tekke tombs*. *Annual of the British School at Athens* 49, 1954, 215-228.
- JEVONS 1875
Jevons, W. S., *Money and the Mechanism of Exchange*. *The International Scientific Series* 17 (New York 1875).
- JURSA 2010
Jursa, M., *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* (with contributions by J. Hackl, B. Janković, K. Kleber, E. E. Payne, C. Waezegggers, M. Weszeli). *Alter Orient und Altes Testament* 377 = *Veröffentlichungen zur Wirtschaftsgeschichte Babyloniens im 1. Jahrtausend v. Chr.* 4 (Münster 2010).
- KARISHKOVSKIJ/LAPIN 1979
Karishkovskij, P. O., Lapin, V. V., *A hoard of coins and metal of the period of the Greek colonization found on Berezan in 1975 [in Russian]*. In: O. Lordkipanidze (ed.), *Problemy grečeskoj kolonizacii severnogo i vostočnogo Pričernomor'ja: Materialy I vsesojuznogo simpoziuma po drevnej istorii pričernomor'ja, Cchaltubo 1977 / Problems of the Greek Colonization in the Northern and Eastern Black Sea* (Tbilissi 1979) 105.
- KERSCHNER/KONUK 2020
Kerschner, M., Konuk, K., *Electrum coins and their archaeological context: The case of the Artemision of Ephesus*. In: P. van Alfen/U. Wartenberg/W. Fischer-Bossert/H. Gitler/K. Konuk/C. C. Lorber (eds.), *White Gold: Studies in Early Electrum Coinage* (New York 2020) 83-190.
- KEYNES 1930
Keynes, J. M., *A Treatise on Money*. Vol. 1: *The Pure Theory of Money* (New York 1930).
- KILLEN 1985
Killen, J. T., *The Linear B tablets and Mycenaean economy*. In: A. Morpurgo Davies/Y. Duhoux (eds.), *Linear B: A 1984 Survey*. *Proceedings of the Mycenaean Colloquium of the VIIIth Congress of the International Federation of the Societies of Classical Studies, Dublin, 27 August-1st September 1984*. *Bibliothèque des Cahiers de l'Institut de Linguistique de Louvain* 26 (Louvain 1985) 241-305.
- KIM 2004
Kim, H. S., *Electrum ingot hoard (2002): A proto-monetary hoard?* *Schweizerische numismatische Rundschau* 83, 2004, 5-16.
- KIM/KROLL 2008
Kim, H. S., Kroll, J. H., *A hoard of Archaic coins of Colophon and unminted silver (CH I.3)*. *American Journal of Numismatics* 20, 2008, 53-103.
- KLEBER 2016
Kleber, K., *The Kassite gold and the Post-Kassite silver standards revisited*. In: K. Kleber/R. Pirngruber (eds.), *Silver, Money and Credit: A Tribute to Robertus J. van der Spek on the Occasion of his 65th Birthday*. *PIHANS* 128 (Leiden 2016) 39-60.
- KOSTOGLU 2003
Kostoglou, M., *Iron and steel currency bars in ancient Greece*. *Mediterranean Archaeology and Archaeometry* 3, 2003, 5-12.
- KROLL 1998
Kroll, J. H., *Silver in Solon's laws*. In: R. Ashton/S. Hurter (eds.), *Studies in Greek Numismatics in Memory of Martin Jessop Price* (London 1998) 225-232.
- KROLL 2001
Kroll, J. H., *Observations on monetary instruments in pre-coinage Greece*. In: M. S. Balmuth (ed.), *Hacksilver to Coinage. New Insights into the Monetary History of the Near East and Greece*. *Numismatic Studies* 24 (New York 2001) 77-91.
- KROLL 2008
Kroll, J. H., *The monetary use of weighed bullion in Archaic Greece*. In: W. V. Harris (ed.), *The Monetary Systems of the Greeks and Romans* (Oxford 2008) 12-37.
- KROLL 2011
Kroll, J. H., *Money of the Greeks and their Near Eastern neighbours before the advent of coinage, and after*. In: GARCÍA-BELLIDO *et al.* 2011, 15-23.
- KROLL 2020
Kroll, J. H., *The inscribed account on lead from the Ephesian Artemisium*. In: P. van Alfen/U. Wartenberg/W. Fischer-Bossert/H. Gitler/K. Konuk/C. C. Lorber (eds.), *White Gold: Studies in Early Electrum Coinage* (New York 2020) 45-59.
- LAZZARINI 2009
Lazzarini, L., *Nota sull'aes grave di Selinunte*. In: C. Antonetti/S. de Vido (eds.), *Temi Selinuntini* (Pisa 2009) 159-175.
- LE RIDER 2001
Le Rider, G., *La Naissance de la Monnaie. Pratiques Monétaires de l'Orient Ancien*. *Histoires* (Paris 2001).
- LEMAIRE 2015
Lemaire, A., *Esclavage pour dettes et autres formes de travail dépendant au Levant: Tradition biblique et épigraphie (Xe-Ve s.)*. In: J. Zurbach (ed.), *La*

- Main-d'œuvre Agricole en Méditerranée Archaique: Statuts et Dynamiques Économiques. *Scripta Antiqua* 73 (Bordeaux 2015) 67-84.
- LEROUXEL 2015
Lerouxel, F., Bronze pesé, dette et travail contraint (*nexum*) dans la Rome archaïque (VIe s.-IVe s. a.C.). In: J. Zurbach (ed.), *La Main-d'œuvre Agricole en Méditerranée Archaique: Statuts et Dynamiques Économiques. Scripta Antiqua* 73 (Bordeaux 2015) 109-152.
- LEROUXEL/ZURBACH 2020
Lerouxel, F., Zurbach, J., Introduction: Le changement plutôt que la croissance. In: F. Lerouxel/J. Zurbach (eds.), *Le Changement dans les Économies Antiques. Scripta Antiqua* 140 (Bordeaux 2020) 9-25.
- MEIKLE 1995
Meikle, S., *Aristotle's Economic Thought* (Oxford 1995).
- MÜLLER 2015
Müller, M., Zur Vorgeschichte des griechischen „Königtums“. *Methodisches, TH Uq 434 und eine neue Deutung der qa-si-re-we. Kadmos* 54, 2015, 55-106.
- NICOLET-PIERRE 2002
Nicolet-Pierre, H., *Numismatique Grecque. Collection U. Histoire* (Paris 2002).
- NICOLET-PIERRE 2006
Nicolet-Pierre, H., Les talents d'Homère. In: P. van Alfen (ed.), *Agoronomia: Studies in Money and Exchange Presented to John H. Kroll* (New York 2006) 1-20.
- PARISE 2000
Parise, N., *La nascita della moneta. Segni premonetari e forme arcaiche dello scambio* (Roma 2000)
- POIGT 2018
Poigt, Th., Weighing premonetary currency in the Iberian Iron Age. In: BRANDHERM *et al.* 2018, 105-131.
- POIGT 2020
Poigt, Th., De poids et de mesure. Les instruments de pesée en Europe occidentale aux âges des Métaux (XIVe-IIIe s. av. n.è.): Conception, usages et utilisateurs [résumé de thèse]. *Bulletin de la Société Préhistorique Française* 117, 2020, 146-149.
- POLANYI 1960
Polanyi, K., On the comparative treatment of economic institutions in Antiquity with illustrations from Athens, Mycenae, and Alalakh. In: C. H. Kraeling/R. M. Adams (eds.), *City Invincible: A Symposium on Urbanization and Cultural Development in the Ancient Near East*, Held at the Oriental Institute of the University of Chicago, December 4-7, 1958 (Chicago 1960) 329-350.
- PULAK 1988
Pulak, C., The Bronze Age shipwreck at Uluburun, Turkey: 1985 campaign. *American Journal of Archaeology* 92, 1988, 1-37.
- SACCONI 2005
Sacconi, A., La 'monnaie' dans l'économie mycénienne: Le témoignage des textes. In: R. Laffineur/E. Greco (eds.), *Emporia: Aegeans in the Central and Eastern Mediterranean. Proceedings of the 10th International Aegean Conference / 10e Rencontre Égéenne Internationale, Athens, Italian School of Archaeology, 14-18 April 2004. Aegaeum* 25 (Liège 2005) 69-74.
- SCHUMPETER 1954
Schumpeter, A. J., *A History of Economic Analysis* (London 1954).
- SIMIAND 1934
Simiand, F., La monnaie, réalité sociale. *Annales Sociologiques, Sér. D, Sociologie Économique* 1934, 1-86.
- THEMELIS 1983
Themelis, P. G., An 8th century goldsmith's workshop at Eretria. In: R. Hägg (ed.), *The Greek Renaissance of the Eighth Century B.C.: Tradition and Innovation*, 1-5 June 1981. *Skrifter utgivna av Svenska Institutet i Athen* 30 (Athens 1983) 186-193.
- VARGYAS 2002/10
Vargyas, P., Monetary hoards in the Egyptian Museum. In: M. Eldamaty/M. Trad (eds.), *Egyptian Collections around the World: Studies for the Centennial of the Egyptian Museum* (Cairo 2002) 1183-1194. Published also in: Z. Csabai (ed.), *From Elephantine to Babylon: Selected Studies of Péter Vargyas on Ancient Near Eastern Economy. Ancient Near Eastern and Mediterranean Studies* 1 (Budapest 2010) 156-164.
- VAN WEES 2013
van Wees, H., *Ships and Silver, Taxes and Tribute: A Fiscal History of Archaic Athens* (London 2013).
- WILL 1954
Will, É., De l'aspect éthique des origines grecques de la monnaie. *Revue Historique* 212, 1954, 209-231.
- ZURBACH 2010
Zurbach, J., La « société homérique » et le don. *Gaia* 13, 2010, 57-79.
- ZURBACH 2013
Zurbach, J., La formation des cités grecques. Statuts, classes et systèmes fonciers. *Annales – Histoire, Sciences Sociales* 68, 2013, 957-998.
- ZURBACH 2017a
Zurbach, J., Les hommes, la terre et la dette en Grèce, ca 1400-ca 500. *Scripta Antiqua* 95 (Bordeaux 2017).
- ZURBACH 2017b
Zurbach, J., Esclaves, dette, monnaie en Grèce mycénienne. In: M. L. Nosch/H. Landenius Enegren (eds.), *Aegean Scripts: Proceedings of the 14th International Colloquium on Mycenaean Studies*, Copenhagen, 2-5 September 2015. *Incunabula Graeca* 105 (Rome 2017) 659-672.
- ZURBACH 2018a
Zurbach, J., New perspectives on money in the Late Bronze to Iron Age Aegean. In: O. Tekin (ed.), *Second International Congress on the History of Money and Numismatics in the Mediterranean World*, 5-8 January 2017, Antalya – Proceedings / İkinci Uluslararası Akdeniz Dünyasında Para Tarihi ve Numismatik Kongresi – Bildiriler (Istanbul 2018) 1-13.
- ZURBACH 2018b
Zurbach, J., Monnaies pesées en plusieurs métaux: Bronze, or, argent en Méditerranée archaïque. In: E. Hiriart/J. Genechesi/V. Cicolani/S. Martin/S. Nie-

to-Pelletier/F. Olmer (eds.), *Monnaies et Archéologie en Europe Celtique: Mélanges en l'honneur de Katherine Gruel*. Bibracte 29 (Glux-en-Glenne 2018) 185-188.

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