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WEIGHING ARTEFACTS IN THE ANCIENT NEAR EAST: FOR A DIALOGUE BETWEEN EPIGRAPHY AND ARCHEOLOGY

DENISE LACAMBRE

ABSTRACT

The ancient Near East has left us a sizeable body of written documents, of which the archives about metal make up a not inconsiderable part. Metal was a rare material, and its circulation gave rise to detailed book-keeping. To an administrator in antiquity it was not the object's appearance that primarily mattered, so much as its mass. The important thing was to be able to note the weight of the metal changing hands. The texts from the ancient city of Mari in Syria, dating from the 19th and 18th centuries BC, provide us with some particularly interesting certifications. Among the 15,000 to 20,000 tablets discovered, at least a thousand of them have to do with accounting for metal. But, despite this plentiful documentation, it is hard to correlate the written data with the objects coming from the archeology digs. Indeed, the great majority of archeology studies, one finds, are based on typological analysis and so do not take weight into account as a datum (besides objects made of precious materials or a few extraordinary discoveries). The point is not to deny the contributions of typology, essential as it is for the scientific analysis of artefacts, but rather to draw attention to the benefits of collecting one objective piece of information: mass. The information would be the more worthwhile for not entailing damage to the object. This would enable us to compare the written sources with the archeology data, and perhaps then to identify and date objects with more confidence.

The ancient Near East has left us a sizeable body of written documents, of which the archives to do with metal make up a not inconsiderable part. Metal was a rare material, especially since there are no mineral deposits in Mesopotamia. The circulation of metal gave rise to detailed book-keeping: to an administrator in antiquity it was not

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the objects' appearance that mattered most, but its mass. The important thing was to be able to note the weight of the metal changing hands. This was the case as early as the 3rd millennium BC, as we can see, for instance, in the Ebla tablets (about 2400-2300 BC)¹ or those from the time of the Empire of Ur III (2112-2004 BC).² But it is the texts from the ancient city of Mari, dating from the 19th and 18th centuries BC³, that provide us with some particularly interesting certifications and from which I shall draw most of the examples I cite. Among the 15,000 to 20,000 tablets discovered there, it has been estimated that at least a thousand of them have to do with accounting for metal. Now, despite this plentiful documentation, it is hard to correlate the written data with the objects coming from the archaeological digs, as very little information has been published on the mass of the objects.⁴

1. THE WRITTEN RECORD OF THE FIRST HALF OF THE 2ND MILLENNIUM BC

Several examples of texts from the Old Babylonian period provide us with information about metal.⁵ Among these, the royal archives of Mari, which have been updated since the 1930s, are the most interesting in this respect. They date largely from the reign of Zimrî-Lîm (1775-1762 BC),⁶ the last king of the city before it was seized and destroyed by Hammurabi of Babylon. It consists of letters but also of a great many administrative texts created by the palace administration. Documents dating from the preceding reigns have also been discovered which refer to the practice of metallurgy or to numerous metal objects. The scribes assigned to the accounting in the Mari palace recorded the weights of metal or alloy objects, whether precious or not, particularly those of bronze weapons and tools,⁷ as the following example shows:

‘3 talents, 31 minas and 10 shekels of bronze (*ca.* 105.6 kg), weight of 205 spears-*šukurrum* of 2/3 mina each (*ca.* 333.3 g), 10 axes-*haššinum*, 10 axes-*agasilikkum*, 10 hoes-*marrum*, 10 tools-*mahlašum*, 2 *mitrûm* and 2 cast axes-*pâšum*, received from Mukannišum in the asphalt chamber (*bît kuprim*), in the presence of the king. (*Date:*) 12th day of month XI. Year when (King) Zimrî-Lîm offered a statue to Haṭṭa (*i.e.*, ZL

1 See, for example, Archi 1993 (with the bibliography) and Archi 1996. See also, for a study of metallurgy in Ebla, Palmieri, Hauptmann 2000.

2 See, for example, Limet 1960.

3 The dates BC are given following the so-called “middle” chronology putting Hammurabi, King of Babylon, at 1792-1750 BC; cf. Charpin 2004.

4 Mass is the size of a body in terms of the attraction it has for another body (based on Larousse 1994). The term “weight” will be used interchangeably with “mass” for convenience of expression. The examples cited in this article, without being exhaustive, are nonetheless meant to be representative.

5 Cf. Reiter 1997.

6 For the history of Mari, cf. Charpin, Ziegler 2003.

7 Quite obviously, only the weight of the metal is known to us, since the portions made of perishable materials have only rarely been preserved. In this paper, the weight of weapons referred to will therefore only refer to the metal portions, the total weight not being something we can reconstruct.

8 = 1767 BC)⁸.

For the administrators, weight was the main thing, for it was the mass of the metal in circulation that mattered to them if they were to manage the inventory of the Mari palace. To keep track of metal was specifically to control a vital area, that of armament.⁹ They even periodically drew up great summary statements on the withdrawals of bronze over several months¹⁰ or a year.¹¹ Given the scarcity of metal, there was even a plan in the time of Samsî-Addu (1792-1775 BC) to empty the tomb of Yahdun-Lîm, the former king of Mari (ca. 1810-ca. 1794 BC), of the bronze kept inside, so as to be able to forge new weapons.¹²

Very few scales of the ancient Near East have come down to us and yet a great many weights have been found. Several studies have been devoted to this topic.¹³ At Mari, weights were discovered in 1979,¹⁴ which then made it possible to observe that ‘these weights corresponded to units of one shekel or more, with the most exact weights varying from the theoretical shekel of 8.42 grams only by about 1 to 2%’.¹⁵

Though the written record from Mari is not unique for the Old Babylonian period, particularly in the area of metals, it has the merit of combining written and archeological data from a reliable stratigraphic setting, at least with respect to recent digs.

2. THE ARCHEOLOGICAL DOCUMENTATION

2.1. A Largely Typological Approach

When an epigraphist peruses dig reports, he notices prominence given to the typological approach, more precisely a morpho-chrono-typology where the artefacts are classified in time according to changes in their shape. (For the sake of simplicity, the term *typology* shall mean this in the rest of the paper.) Now, the weight of metal objects is almost never indicated,¹⁶ even though a desire to understand the techniques mastered and their dissemination has for some time led people to analyze the metallic

8 *ARMT* XXV 204 (= M.11195, cf. Limet 1986: 64 n. 204; collations of J.-M. Durand, cited in Lacambre 2002: 8 and n. 35). The equivalences for measuring weight are as follows: 1 talent = 60 minas ; 1 mina = 60 shekels (about 500 g); 1 shekel = 180 barleycorns (about 8.333 g) (cf. Powell 1987-90: 508-517 § V).

9 In Mari, see, for example, Durand 1983b: 336-350; 1998: 387-394.

10 *ARMT* XXII 203^r = Durand 1990: 160-177.

11 *ARMT* XXII 204^r = Lacambre 1997: 91-103, n. 7.

12 See letter A.2177 and its commentary, cited in Ziegler 2000: 17-19 (in translation only).

13 Cf. Powell 1979, for example; a recent study can be found in Bry 2005: 143-175.

14 Cf. Margueron 1982: 27-29 and Fig. 6; Bry 2005: 154-155.

15 Cf. Joannès 1989: 121 n. 34.

16 Ph. Quenet (2008: 55) fairly observes that ‘it quickly becomes apparent when looking over dig reports that linear measurements dominate, with weight measurements not being deemed worthwhile (...)’ (‘on s’aperçoit bien vite en parcourant les rapports de fouilles que les mesures métriques l’emportent de loin, les mesures pondérales n’ayant pas été jugés dignes d’intérêt (...)’).

composition of objects. One need only think of M. Berthelot and his analysis ‘sur quelques métaux et minéraux provenant de l’antique Chaldée’ in 1889¹⁷ or of the work of O. Montelius in the early 20th century.¹⁸

In the area of bronze tools, for example, the monumental work of J. Deshayes is based solely on typology.¹⁹ But without any indication of mass, it is very hard to make a correlation between the name of an object mentioned in the texts and the one discovered in a dig. This type of research is found in works from the 1970s, like that on spears in the Bronze Age by A. de Maigret²⁰ or in the 1980s, like that on Syro-Palestinian weapons by G. Philip.²¹ Then again, in the series *Prähistorische Bronzefunde*, the volumes about the ancient Near East sometimes give indications of weight, notably the one on Mesopotamian metallic table ware.²² This is not systematic, however, and certain volumes still only feature the typological approach²³ and therefore give no indication of weight. Similarly, in museum catalogues mass is almost never mentioned (cf. for example, Muscarella 1988). It sometimes happens for objects of gold or silver, which carry more prestige, but that is far from being the rule.

2.2. Weighing Artefacts

To summarize, the first observation we must make is that only objects considered to be precious or extraordinary are weighed when they are discovered, even if their mass is not always shown in the exhibition catalogue. Among the copper-alloy objects, the statue of the Elamite queen Napir-Asu (14th c. BC), conserved in the Louvre, weighs nearly 1,750 kg. This weight could not in fact have been ignored, since this is undoubtedly one of the heaviest metal objects to come down to us from antiquity.²⁴ Still, for certain big discoveries in oriental archeology, like that of the “royal tombs” of Ur in the late 1920s, no indications of weight were given in the final report.²⁵

Be that as it may, these highly precious metal objects come down to us in a lower proportion than other objects because in antiquity they were repeatedly melted down. This phenomenon is well attested, for example in the Mari texts.²⁶ For the contribution made by epigraphy to Mesopotamian archeology, one can consult the short article by J.-R. Kupper,²⁷ which summarizes everything that the texts can tell us about the

17 Berthelot 1938 (reprint of the 1889 edition): 219-228.

18 Montelius 1916-23.

19 Deshayes 1960. There he particularly followed the principles laid down by A. Leroi-Gourhan in his famous book, *L’Homme et la Matière* (1943; see Deshayes 1960: 23-36).

20 De Maigret 1976.

21 Philip 1989.

22 Cf. Müller-Karpe 1993.

23 See, for example, Shalev 2004.

24 Cf. Benoît 2003: 358-359, notice 78 with the bibliography; as to the technical aspect of its fabrication, see more specially Meyers 2002.

25 Cf. Woolley 1934.

26 Cf. the comments of Durand 1983a: 138-139 on the recovery of the metal and its recasting by the palace craftsmen.

27 Kupper 2000.

various monuments that have disappeared - temples, statues and so on. Thus some Mari tablets give us a description of temples which must have stood in North Syria and that archeologists should someday discover in Tell Barri (ancient Kahat) or in Tell Leilan (ancient Šubat-Enlil), for example.²⁸ Thus it is that the precious tableware of the palace is known to us only through the tablets that recorded it,²⁹ giving us a glimpse into what may have been the wealth of the city's last king. When a hoard is found, though, not everything is necessarily weighed; some artefacts draw only scant attention. Thus in the case of the hoard of Tôd, in Egypt, preserved in four chests in the name of Amenemhet II (1929-1895 BC) and discovered in 1936 by F. Bisson de la Roque, what was metal - gold and silver - was weighed. However, this had not been the case with the great quantity of lapis lazuli found in the two larger chests,³⁰ a material which nonetheless carried a very high price at that time (cf. § 3.3.1 below). Likewise, when the so-called "goldsmith's jar" was discovered at Larsa, undoubtedly dating from 1738 BC, only the weights and the two gold medallions were weighed.³¹ But the silver remnants were not,³² while this was maybe the form that this metal took at that time for exchange purposes (*Hacksilber*).³³ A similar find was recently made at Terqa,³⁴ and a new example from Mari, which would also date from the 2nd millennium, has been pointed out by G. Le Rider.³⁵ Nevertheless, the viewpoint has changed a great deal in terms of the digger's attitude to the gold and silver hoard of Tell El-Amarna, in Egypt, dating from the end of the 18th dynasty and found in a jar buried under the courtyard of house T.36.63 in 1930.³⁶ The items were carefully

28 Cf. Charpin 1981; 1983.

29 Guichard 2005.

30 Bisson de la Roque 1950; Bisson de la Roque *et al.* 1953. Research on the items of lapis lazuli of Tôd was undertaken by a team consisting of M. Casanova (University of Rennes 2 and UMR 7041), V. Danrey (UMR 5133), D. Lacambre (University of Lille 3 and UMR 8164), G. Pierrat (Museum of the Louvre) and Ph. Quenet (University of Strasbourg and UMR 7044).

31 Cf. Bjorkman 1993: 9: 'Unfortunately, none of the metal scrap or jewelry in the hoard has been weighed, except for the two medallions with granulation' and note 41, and the reply in Huot 1995: 268.

32 This concerns the silver remnants presented in Arnaud *et al.* 1979: 15 Fig. 45, 19 Fig. 46, 25 Fig. 49, 32 Fig. 50 and 41. Though some bits made it possible to reconstitute portions of the jewelry, J.-L. Huot also pointed out that a good deal of the silver was in 'tiny pieces (...) reduced by corrosion to an extremely fine, purple dust.' ('menus morceaux (...) réduits par la corrosion à l'état d'une poussière violette impalpable.'). Cf. Huot 1995: 268. For a treatment of how the silver might have been packed into the jar in sealed bags (from 1/3 up to 15 shekels), cf. Vargyas 2005.

33 Cf. Balmuth 2001: 9: 'Ancient Near Eastern hoards of randomly shaped silver, generically called *Hacksilber*, have come increasingly to be interpreted as hoards of pre-coinage currency.' On money, cf. Powell 1999.

34 Cf. Rouault 1997: 77; 2001: 10, where according to him, it was a matter of '(...) a small hoard of fragments of recovered silver, a large portion of which was cut into small pieces and undoubtedly intended for use as a means of payment. A neighboring tablet confirms this use by referring probably to lending practiced by the owner of the house.' ('(...) un petit trésor constitué de fragments d'argent de récupération dont une bonne partie coupés en petits morceaux, et sans aucun doute destinés à être utilisés comme moyen de paiement. Une tablette voisine confirme cette utilisation en faisant probablement allusion aux activités de prêteur du propriétaire de la maison.').

35 Le Rider 2001: 2.

36 Cf. Frankfort, Pendlebury 1933: 59-61 and Pl. 43; Kemp 2006: 316 Fig. 110. It had been called the

recorded; but after the Anglo-Egyptian treaty, a portion was sold by the digger to the Bank of England on the pretext that it was of no real interest³⁷ - and because it was a convenient way to raise funds for his next project.³⁸

A failure to weigh metal or alloy objects that are not thought to be precious (and even when they are) was generally the rule and remains so most of the time.

3. FOR A SYSTEMATIC WEIGHING OF OBJECTS

3.1. *New Data from the Old Babylonian Period with Regard to Metal*

3.1.1. The Identification of Two Weapons of the Period from the Mari Archives

Two recent studies give us an idea of what might be possible were we to have a systematic weighing of copper-alloy weapons to compare with the written record.

In a recent article, J.-R. Kupper³⁹ has been one of the few to indicate the weight of a spearhead being studied (83.45 g). This enabled him to compare it with the weight of the *nazînum*-weapon attested in the Mari texts, having a weight of 10 shekels (or about 83,3 g), which does suggest a connection.

This path-breaking was followed by J.-L. Montero Fenollós, who worked in concert with the epigraphist J. Vidal. They were able to establish, though going on an extremely small corpus,⁴⁰ that a spearhead found at Mari and weighing between 50 g and 55 g had to be connected with the *zamrâtum*-weapon. Indeed, it is often mentioned in the texts as weighing 6 shekels, or about 50 g.⁴¹

In the area of armament, a more sizeable corpus could allow a close collaboration between archeologists and epigraphists, from which tangible results could certainly be expected.

3.1.2. The Discoveries of Tell Sifr (Ancient Kutalla)

Tell Sifr, in southern Iraq, was explored by Loftus in 1854 following accidental

“Crock of Gold” hoard.

37 Chubb 1954: 134: ‘(...) from the point of view of archaeology it has absolutely no value whatever (...) (it) is just melted down gold and silver. (...)’ quoted by Bell 1986: 146-147 n. 19.

38 Chubb 1954: 175: ‘The committee [of the *Egypt Exploration Society*] later on decided that it was permissible to sell our share of gold and silver, and the Bank of England paid us £ 200 for it, which was credited to the funds for digging at Amarna the following season.’ Quoted in Bell 1986: 146-147 n. 19. See the parallel case of the silver from a 4th c. BC hoard found in Babylon in 1882, which was melted down soon thereafter. Cf. Le Rider 2001: 3.

39 Kupper 2001.

40 Weight of just two spears known, and comparison made with nine other similar spears from Mari, not weighed. It is due to the numerous *comparanda* of contemporaneous weapons (21 additional examples) available in Hauptmann, Pernicka 2004, where they were weighed, that they can be studied.

41 Cf. Montero Fenollós, Vidal 2006.

discoveries that had occurred at this site with the promising name.⁴² Not far from several dozen cuneiform tablets dating from the time of Hammurabi, he found a lot of 86 objects of copper and bronze.⁴³ This remains one of the rare examples we have of an entire set of agricultural implements from the early 2nd millennium BC.⁴⁴ They were not published in their entirety until the 1970s and 1980s. Some tools were even weighed but not systematically.⁴⁵ What is interesting, however, is that according to Loftus, the date of the objects could be deduced from the archives found nearby.⁴⁶ This point of view has been accepted ever since. But it was not until the work of D. Charpin⁴⁷ that these archives were fully and finally published. They are said to date from the 19th and 18th c. BC. Although the archives do not speak of metal (the Šilli-Eštar archives mostly record land purchases), they enable us to date relatively precisely the metal objects, since at Kutalla no text is later than the year Samsu-iluna 10 (1740 BC)⁴⁸ and all the South was abandoned as of the end of year 11 of Samsu-iluna (1739 BC)⁴⁹. One could therefore compare these tools with the contemporaneous textual data in order to propose identifications, as was done by K. van Lerberghe, who had collected the weight information on the ḫabuda-tool, to come to the conclusion that it was undoubtedly a hand hoe or an adze.⁵⁰

3.1.3. For a History of Prices?

Not only do we have numerical data about metal objects, such as weapons, but also a way to calculate their value in silver, which allows us to make comparisons with other items. There is in fact a close link between an object's mass and its value throughout the history of the Ancient Near East.⁵¹ Much research into prices has been done, such as that by H. Farber,⁵² by M.A. Powell⁵³ or by J.-R. Kupper⁵⁴ with regard to Mari. So

42 'The name of Tel "Sifr" is derived from the numerous "copper" articles found by the Arabs in the vaults (...)', cf. Loftus 1857: 268.

43 This extraordinary discovery of objects had greatly interested O. Montelius, the founder of the typological method. He had published a selection of it and undertaken the metallic analysis of a knife, cf. Montelius 1916-23: 206-207 and 210.

44 There is another example of one, bought on the antiquities market and conserved at the Oriental Institute of Chicago but which is still unpublished as far as I can tell, cf. Moorey 1994: 262 (with the references).

45 Cf. Moorey 1971; four objects not found were then published in Moorey *et al.* 1988.

46 'The actual date of these copper objects is, however, to be inferred from that of the "enveloped" clay tablets which were found close to them.' Cf. Loftus 1857: 270.

47 Charpin 1980.

48 Charpin 1980: 195.

49 Charpin 2004: 342.

50 'Une houe à main ou herminette', cf. Van Lerberghe 1982.

51 This close link between mass and value is not specific to the ancient Near East: see, for example, the comments about ancient Egypt in Kemp 2006: 319 ff. It has also been studied in the Aegean world, especially in the works of A. Michailidou (2001; 2003; 2005).

52 Farber 1978.

53 Powell 1990.

54 Kupper 1982. The essential article on this topic remains that of J.-R. Kupper (1982); but it needs

we know the prices of a wide variety of goods, from grains to slaves, including the prices of metal. In terms of armaments, one could estimate expenditures for metal in the palace just as well as the costs of keeping an army.⁵⁵ In the case of the tools of Tell Sifr, mostly of copper (cf. § 3.1.2), taken together they weighed over 42 kg;⁵⁶ and one could make a tentative estimate of their value. It is known that in this era the ratio of silver to bronze was 1:180, which lets us estimate a minimum value for these tools of at least 28 shekels of silver.⁵⁷

But the reverse calculation is equally possible - trying to value the price of an object from a dig according to its date. (For example, what value to attribute to an axe in a tomb: was this a costly object for such and such a period? And so forth). Data about weight would once again be indispensable.

3.2. *Weight and Experimental Archeology*

Knowledge of weight would allow us to make progress in the reconstruction of objects through experimental archeology. We can be sure that weapons were handled in different ways depending on their weight.⁵⁸ Trials have been conducted, for example, in the field of archery of the ancient Near East.⁵⁹

But for other periods of ancient history, this approach is more common. The famous analysis of V.D. Hanson⁶⁰ on the war in Greece took into account the weight of the equipment in order to get an understanding of the Greek hoplite, especially by relying on several experiments in reconstruction (cf. Ch. 6: The Burden of Hoplite Arms and Armor). Similarly, in the field of research on the Roman army, there is in particular a *Journal of Roman Military Equipment Studies* (Oxford) devoted to this subject.⁶¹ As for the Ermine Street Guard,⁶² a group that has for some thirty years recreated the 20th Legion *Valeria Victrix* by working in close contact with researchers, it is now quite famous.

For the archeologist, research in the field of experimental archeology is possible with data on weight. For the epigraphist, this one of the few pieces of information that permit him to draw a link between his texts and the artefacts that are discovered.

updating, for in a quarter century the Mariotic documentation has grown considerably. In terms of metal, see the amplification in Joannès 1993-97: 99-100 § 3.

55 For a first approach, cf. Lacambre 2006-07.

56 I thank Ms. Sarah Collins, conservator at the *British Museum*, for weighing all the items from Tell Sifr and informing me of the results. A study of the matter is being prepared.

57 Cf. Powell 1990: 82 ff. At the present time, we still find it hard to quantify the value of the work that went into a given manufactured object.

58 For the time being, cf. Lacambre 2006-07. A recent attempt to reconstruct the axe handles opens up interesting prospects, cf. Quenet 2004.

59 See for example Miller *et al.* 1986: 189-190.

60 Hanson 1989.

61 See especially Croom, Griffiths 2000, devoted to the following topic: *Re-Enactment as Research*.

62 Cf. Haines, Sumner 2000 and <http://www.erminestreetguard.co.uk/index.html>.

3.3. Weighing Other Objects?

We have seen the intrinsic connection between mass and value in the ancient Near East and in antiquity in general with respect to metal. It would be worthwhile seeing if weighing other objects might not yield interesting results.

3.3.1. Cylinder Seals

Cylinder seals, for example, which have been found by the thousands in the ancient Near East, have until now received essentially iconographic study. The seal is a precious object, first by its connection with its owner but also by the material it is made from. It has become the practice to determine the latter based on various analyses,⁶³ and yet its mass is never taken into account. Now, only its weight, together with an analysis of its composition, would make it possible to evaluate its worth. Recently C. Michel has attempted this calculation, based on data taken from Assyrian traders' tablets (19th-18th c. BC). She used the following formula to obtain the mass of a cylinder seal of lapis lazuli⁶⁴: 'The volume of the cylinder is $V = \pi R^2 H$ and its mass $M = \rho V$, ρ being its density. The density of lapis lazuli lies between 2.4 and 2.5 g/cm³'. In this way she was able to establish the mass of three cylinder seals (1.6 g, 1.9 g and 5 g) found in a tomb at Aššur (Tomb 20; Ass. 20504) and dating from the Old Assyrian era.⁶⁵ According to an Old Assyrian text, the ratio of silver to lapis lazuli was 11:1.⁶⁶ Using this assumption, the value in silver of the aforementioned seals would run from 17.6 g (about 2 shekels) to about 55 g (about 6 1/2 shekels).

Rather than resorting to such calculations for each seal, it would be far easier to weigh them. The epigraphist could then work in concert with the glyptic expert, not only to read the cuneiform inscription but also to determine its value according to the time period.

3.3.2. The Weight of Tablets

One can then imagine research on a final object dear to the epigraphist's heart: the tablet. Could it be useful to weigh these objects whose primary interest lies in what is written on them and not, usually, in what they are made of? It does seem pointless, at first. Nevertheless, evaluating the average weight of a tablet from Mari (100 g) has allowed us to establish how they arranged the 4,000 tablets of administrative and diplomatic correspondence found in room 115 of the palace in the absence of a record from the time of the dig by A. Parrot. Indeed, D. Charpin has made a connection

63 See the research on cylinder seals in the collections of the *British Museum* published in Collon 1982 or Collon 1986 for example.

64 Based on Michel 2001: 355 n. 122. She assumed that the hollow center of a cylinder seal, which usually has a hole through it, was negligible.

65 Cf. Michel 2001: 354-355 (with the bibliography).

66 Cf. Michel 2001: 350 quoting F. de la Grange 4: 11-12.

between seven clay labels, noting that they were attached to tablet chests discovered in room 115, and the approximate weight that could be contained in each chest (about 45 kg). The average weight of all the letters left by Hammurabi of Babylon at Mari, shortly before the ultimate destruction of the city, would be compared these seven chests.⁶⁷ The question of how the texts were stored in room 115 of the palace at the time of their discovery by A. Parrot could be resolved, through a calculation of the weight of the tablets there.

CONCLUSION

The point is not to deny the contributions of typology, essential as it is for a scientific analysis of artefacts, for as the French archeology A. Schnapp reminds us, 'Without typology there is no other approach than the aesthetic'.⁶⁸ The point is rather to draw attention to the benefits of collecting one objective piece of information, mass, despite certain limitations (such as the problem of corrosion).

Except for the recent research conducted under the direction of H. Hauptmann and E. Pernicka,⁶⁹ the majority of archeology studies of objects, relying as they do on a typological analysis, do not take mass into consideration as a datum. It is, however, impossible for the epigraphist to refer to them, since the ancient scribe was only interested in the quantity of metal used in the fabrication of this or that object. The way an object looks is only very rarely noted in our administrative texts.

The same holds true for certain literary texts, as in an Old Babylonian version of the Gilgameš Epic. In order to arm Enkidu and Gilgameš for their confrontation with Huwawa-Humbaba, the guardian of the Forest of Cedar, some fantastically heavy weapons are forged:

‘They took [each other (by the hand)] and *betook themselves* to the forge,
(where) the craftsmen were sitting down in discussion.
Great hatchets they cast,
they cast axes of three talents each (*90 kg*).
Great daggers they cast:
the blades were two talents each (*60 kg*),
half a talent were the crests of their handles (*15 kg*),
the daggers’ gold mountings were half a talent each (*15 kg*).
Gilgameš and Enkidu had a load of ten talents each (*300 kg*)’.⁷⁰

Thus the promising results obtained in certain studies of metal⁷¹ should be an

67 Cf. Charpin 1995: 36-37.

68 Schnapp 1998: 395 ('Sans typologie il n'y a d'autre voie que celle de l'esthétique').

69 Hauptmann, Pernicka 2004.

70 George 2003: 200-201: Old Babylonian Tablet III, v. 163-171.

71 Cf. Montero Fenollós, Vidal 2006.

incentive to increased collaboration between archeology and epigraphists of the Ancient Near East. This would enable us to compare the written sources with the archeology data and perhaps then to identify and date objects with more confidence. Several papers have been written on this subject and have shown the obvious value of bringing together archeology and epigraphical data.⁷² There is one point that should be particularly stressed: weighing an artefact is, for once, not destructive, whereas the archeology, as A. Leroi-Gourhan tells us, is ‘the only member of the historical sciences who destroys most of his documentation by studying it’.⁷³ It should also be noted that carrying it out is relatively simple and the cost of it is low compared to laboratory analyses. Weighing a greater number of artefacts is called for, whether in the Near East or elsewhere, given the encouraging results we can expect.

Bibliography

- Archi, A.
 1993 Bronze Alloys in Ebla: in M. Frangipane *et al.* (eds), *Between the Rivers and over the Mountains, Archaeologica Anatolica et Mesopotamica Alba Palmieri Dedicata*, Rome, pp. 615-625.
 1996 Les comptes rendus annuels de métaux (CAM): in J.-M. Durand (ed.), *Mari, Ébla et les Hourrites: dix ans de travaux. Première partie* (= Amurru 1), Paris, pp. 73-99.
- Arnaud, D. *et al.*
 1979 Ilšu-ibnišu, orfèvre de l’E.BABBAR de Larsa. La jarre L.76.77 et son contenu: in *Syria* 56, pp. 1-64.
- Balmuth, M.S. (ed.)
 2001 *Hacksilber to Coinage: New Insights into the Monetary History of the Near East and Greece* (= Numismatic Studies 24), New York.
- Bell, M.R.
 1986 A Hittite Pendant from Amarna: in *AJA* 90, pp. 145-151.
- Benoît, A.
 2003 *Art et archéologie: les civilisations du Proche-Orient ancien* (= Manuels de l’Ecole du Louvre), Paris.
- Berthelot, M.
 1938 *Introduction à l’étude de la chimie des Anciens et du Moyen-Âge* (nouveau tirage de l’édition de 1889), Paris.
- Bisson de la Roque, F.
 1950 *Catalogue général des Antiquités égyptiennes du musée du Caire. Nos*

72 Cf. for example Gates 1988; Postgate 1990; Zettler 1996; 2003; see, finally, the study on the bricks at Nuzi by Lion, Sauvage 2005.

73 Leroi-Gourhan 1983: 135 (‘le seul représentant des sciences historiques qui détruit la plus grande partie de sa documentation en l’étudiant’).

- 70501-70754. *Trésor de Tôd*, Cairo.
- Bisson de la Roque, F. *et al.*
 1953 *Le trésor de Tôd* (= DFIAO 11), Cairo.
- Bjorkman, J.K.
 1993 The Larsa Goldsmith's Hoards - New Interpretations: in *JNES* 52, pp. 1-23.
- Bry, P.
 2005 *Des règles administratives et techniques à Mari. Contribution à la mise au jour multidisciplinaire de modes opératoires* (= AuOr Suppl. 20), Sabadell-Barcelona.
- Charpin, D.
 1980 *Archives familiales et propriété privée en Babylonie ancienne: étude des documents de «Tell Sifr»*, Geneva-Paris.
 1981 Le temple de Kahat d'après un document inédit de Mari: in *MARI* 1, pp. 137-147.
 1983 Temples à découvrir en Syrie du Nord d'après des documents inédits de Mari: in *Iraq* 45, pp. 56-63.
 1995 La fin des archives dans le palais de Mari: in *RA* 89, pp. 29-40.
 2004 Histoire politique du Proche-Orient amorrite (2002-1595): in P. Attinger *et al.* (eds), *Mesopotamien. Die altbabylonische Zeit* (= OBO 160/4), Fribourg-Göttingen, pp. 25-480.
- Charpin, D., Ziegler, N.
 2003 *Mari et le Proche-Orient à l'époque amorrite. Essai d'histoire politique* (= Florilegium marianum V), Paris.
- Chubb, M.
 1954 *Nefertiti Lived Here*, London.
- Collon, D.
 1982 *Catalogue of the Western Asiatic Seals in the British Museum, Cylinder Seals II. Akkadian-Post Akkadian, Ur III Periods*, London.
 1986 *Catalogue of the Western Asiatic Seals in the British Museum, Cylinder Seals III. Isin-Larsa and Old Babylonian Periods*, London.
- Croom, A.T., Griffiths, W.B. (eds)
 2000 *Re-Enactment as Research. Proceedings of the Twelfth International Roman Military Equipment Conference* (= Journal of Roman Military Equipment Studies 11), Oxford.
- Deshayes, J.
 1960 *Les outils de bronze, de l'Indus au Danube (IV^e au II^e millénaire)* (= BAH 71), Paris.
- Durand, J.-M.
 1983a Relectures d'ARMT VIII, II: ARMT VIII, 89 et le travail du métal à Mari: in *MARI* 2, pp. 123-139.
 1983b *Textes administratifs des salles 134 et 160 du palais de Mari* (= ARMT

- XXI), Paris.
- 1990 *ARM III, ARM VI, ARMT XIII, ARMT XXII*: in Ö. Tunca (ed.), *De la Babylonie à la Syrie, en passant par Mari. Mélanges offerts à Monsieur J.-R. Kupper à l'occasion de son 70^e anniversaire*, Liège, pp. 149-177.
- 1998 *Les documents épistolaires du palais de Mari*, t. II (= LAPO 17), Paris.
- Farber, H.
- 1978 A Price and Wage Study for Northern Babylonia during the Old Babylonian Period: in *JESHO* 21, pp. 1-51.
- Frankfort, H., Pendlebury, J.D.S.
- 1933 *The City of Akhenaten II*, London.
- Gates, M.-H.
- 1988 Dialogues between Ancient Near Eastern Texts and the Archaeological Record: Test Cases from Bronze Age Syria: in *BASOR* 270, pp. 63-91.
- George, A.R.
- 2003 *The Babylonian Gilgamesh Epic*, Oxford.
- Guichard, M.
- 2005 *La vaisselle de luxe des rois de Mari* (= ARMT XXXI), Paris.
- Haines, T., Sumner, G.
- 2000 Recreating the World of the Roman Soldier: the Work of the Ermine Street Guard: in *Journal of Roman Military Equipment Studies* 11, pp. 119-127.
- Hanson, V.D.
- 1989 *The Western Way of War. Infantry Battle in Classical Greece*, London.
- Hauptmann, H., Pernicka, E. (ed.)
- 2004 *Die Metallindustrie Mesopotamiens von den Anfängen bis zum 2. Jahrtausend v.Chr.* (= Orient-Archäologie 3), Rahden.
- Huot, J.-L.
- 1995 À propos du trésor de Larsa: in U. Finkbeiner *et al.* (eds), *Beiträge zur Kulturgeschichte Vorderasiens. Festschrift für Rainer Michael Boehmer*, Mainz, pp. 267-271.
- Joannès, F.
- 1989 La culture matérielle à Mari (IV): les méthodes de pesée. À propos d'un ouvrage récent: in *RA* 83, pp. 113-151.
- 1993-97 Metalle und Metallurgie A.: in *RIA* 8, pp. 96-112.
- Kemp, B.J.
- 2006² *Ancient Egypt. Anatomy of a Civilization* (2nd revised ed.), London-New York.
- Kupper, J.-R.
- 1982 Les prix à Mari: in *OLA* 13, pp. 115-121.
- 2000 Les sources écrites au service de l'archéologie mésopotamienne: in *Académie Royale de Belgique, Bulletin de la Classe des Lettres*, 6^e série, t. XI, 1-6, pp. 95-106.

- 2001 Une pointe d'arme inscrite: in *Akkadica* 122, pp. 55-58.
Lacambre, D.
- 1997 La gestion du bronze dans le palais de Mari: collations et joints à *ARMT XXII*: in *Florilegium marianum* III, pp. 91-123.
- 2002 Études sur le règne de Zimrî-Lîm de Mari: in *RA* 96, pp. 1-21.
- 2006-07 La pesée des artefacts au Proche-Orient ancien: pour un dialogue entre épigraphie et archéologie: in V. Verardi *et al.* (eds), *Table ronde - La métallurgie de transformation des alliages cuivreux : thème 3* (= Cahier des thèmes transversaux ArScAn VIII), Nanterre, pp. 43-55.
- Le Rider, G.
- 2001 *La naissance de la monnaie. Pratiques monétaires de l'Orient ancien*, Paris.
- Leroi-Gourhan, A.
- 1943 *L'Homme et la Matière*, Paris.
- 1983 *Le fil du temps. Ethnologie et Préhistoire 1935-1970*, Paris.
- Limet, H.
- 1960 *Le travail du métal au pays de Sumer*, Paris.
- 1986 *Textes administratifs relatifs aux métaux* (= *ARMT XXV*), Paris.
- Lion, B., Sauvage, M.
- 2005 Les textes de Nuzi relatifs aux briques: in *SCCNH* 15, pp. 57-100.
- Loftus, W.K.
- 1857 *Travels and Researches in Chaldaeia and Susiana*, London.
- Margueron, J.-Cl.
- 1982 Mari. Rapport préliminaire sur la campagne de 1979: in *MARI* 1, pp. 9-30.
- De Maigret, A.
- 1976 *Le lance nell'Asia anteriore nell'Età del Bronzo. Studio tipologico* (= *Studi semitici* 47), Rome.
- Meyers, P.
- 2002 The Casting Process of the Statue of Queen Napir-Asu in the Louvre: in C. Mattusch *et al.* (eds), *From the Parts to the Whole* (= *Journal of Roman Archaeology. Supplementary Series N. 39*), Portsmouth, pp. 11-18.
- Michailidou, A.
- 2001 Recording Quantities of Metal in Bronze Age Societies in the Aegean and the Near East: in A. Michailidou (ed.), *Manufacture and Measurement. Counting, Measuring and Recording Craft Items in Early Aegean Societies* (= *MEΛETHMATA* 33), Athens, pp. 85-119.
- 2003 Measuring Weights and Value in Bronze Age Economies in the Aegean and the Near East: a Discussion on Metal Axes of No Practical Use: in *Aegaeum* 24, pp. 301-314.
- 2005 *Weight and Value in Pre-Coinage Societies. An Introduction* (= *MEΛETHMATA* 42), Athens.

- Michel, C.
2001 Le lapis-lazuli des Assyriens au début du II^e millénaire av. J.-C.: in W.H. van Soldt *et al.* (eds), *Veenhof Anniversary Volume. Studies Presented to Klaas R. Veenhof on the Occasion of His Sixty-Fifth Birthday*, Leiden, pp. 341-359.
- Miller, R. *et al.*
1986 Experimental Approaches to Ancient Near Eastern Archery: in *World Archaeology* 18, pp. 178-195.
- Montelius, O.
1916-1923 *Die älteren Kulturperioden im Orient und in Europa. II: Babylonien, Elam, Assyrien*, Stockholm.
- Montero Fenollós, J.-L., Vidal, J.
2006 El arte de la guerra en el período paleobabilónico. Propuesta para una tipología textual y arqueológica de las lanzas del ejército de Mari: in G. del Olmo Lete *et al.* (eds), *šapal tibnim mû illakû. Studies Presented to Joaquín Sanmartín on the Occasion of his 65th Birthday* (= AuOr Suppl. 22), Sabadell (Barcelona), pp. 315-323.
- Moorey, P.R.S.
1971 The Loftus Hoard of Old Babylonian Tools from Tell Sifr in Iraq: in *Iraq* 33, pp. 61-86.
1994 *Ancient Mesopotamian Materials and Industries. The Archaeological Evidence*, Oxford.
- Moorey, P.R.S. *et al.*
1988 New Analyses of Old Babylonian Metalwork from Tell Sifr: in *Iraq* 50, pp. 39-48.
- Müller-Karpe, M.
1993 *Metallgefäße im Iraq I. Von den Anfängen bis zur Akkad-Zeit* (= PBF II, 14), Stuttgart.
- Muscarella, O.W.
1988 *Bronze and Iron. Ancient Near Eastern Artefacts in the Metropolitan Museum of Art*, New York.
- Palmieri, A., Hauptmann, A.
2000 Metals from Ebla: Chemical Analyses of Metal Artefacts from the Bronze and Iron Ages: in P. Matthiae *et al.* (eds), *Proceedings of the 1st International Congress of the Archaeology of the Ancient Near East. Rome, May 18th-23rd 1998*, Rome, pp. 1259-1281.
- Philip, G.
1989 *Metal Weapons of the Early and Middle Bronze Ages in Syria-Palestine* (= BAR S 526), Oxford.
- Postgate, J.N.
1990 Archaeology and the Texts - Bridging the Gap: in *ZA* 80, pp. 228-240.

- Powell, M.A.
 1979 Ancient Mesopotamian Weight Metrology: Methods, Problems and Perspectives: in M.A. Powell, R.H. Sack (eds), *Studies in Honor of Tom B. Jones* (=AOAT 203), Neukirchen-Vluyn-Kevelaer, pp. 71-109.
 1987-90 Masse und Gewichte: in *RLA* 7, pp. 457-517.
 1990 Identification and Interpretation of Long Term Price Fluctuations in Babylonia: More on the History of Money in Mesopotamia: in *AoF* 17, pp. 76-99.
 1999 *Wir müssen unsere Nische nutzen: Monies, Motives and Methods in Babylonian Economics*: in J.G. Dercksen (ed.), *Trade and Finance in Ancient Mesopotamia* (= MOS Studies 1), Leiden-Istanbul, pp. 5-23.
- Quenet, Ph.
 2004 Une lame en croissant de lune de Tell Chagar Bazar: in *Syria* 81, pp. 43-56.
 2008 *Les échanges du Nord de la Mésopotamie avec ses voisins proche-orientaux au III^e millénaire (ca. 3100-2300 av. J.-C.)* (= Subartu 22), Turnhout.
- Reiter, K.
 1997 *Die Metalle im alten Orient unter besonderer Berücksichtigung altbabylonischer Quellen* (= AOAT 249), Münster.
- Rouault, O.
 1997 Ashara-Terqa, les fouilles de 1997: in *Orient-Express* 1997/3, pp. 75-77.
 2001 Terqa et sa région (6^e-1^{er} millénaires av. J.-C.). Recherches récentes: in *Akkadica* 122, pp. 1-26.
- Schnapp, A.
 1998 *La conquête du passé. Aux origines de l'archéologie*, Paris.
- Shalev, S.
 2004 *Swords and Daggers in Late Bronze Age Canaan* (= PBF IV, 13), Stuttgart.
- Van Lerberghe, K.
 1982 À propos d'un outil agricole, la ḫabuda: in *OLA* 13, pp. 279-285.
- Vargyas, P.
 2005 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*, Bethesda (USA), pp. 587-592.
- Woolley, C.L.
 1934 *The Royal Cemetery. A Report on the Predynastic and Sargonid Graves excavated between 1926 and 1931* (= UE II), London-Philadelphia.
- Zettler, R.L.
 1996 Written Documents as Excavated Artefacts and the Holistic Interpretation of the Mesopotamian Archaeological Record: in J.S. Cooper, G.M. Schwartz (eds), *The Study of the Ancient Near East in the Twenty-First Century*, Winona Lake, pp. 81-101.
 2003 Reconstructing the World of Ancient Mesopotamia: Divided Beginnings

and Holistic History: in *JESHO* 46, pp. 1-45.

Ziegler, N.

2000 Aspects économiques des guerres de Samsî-Addu: in J. Andreau *et al.* (eds), *Economie antique. La guerre dans les économies antiques* (= Entretiens d'Archéologie et d'Histoire. Saint-Bertrand-de-Comminges), Saint-Bertrand-de-Comminges, pp 13-33.