

# WORD-SMITHING: SOME METALLURGICAL TERMS IN HEBREW AND ARAMAIC\*

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For Felix Posen Dr.h.c.  
in friendship and gratitude

## 1. *Introduction*

We have already heard quite a bit about the merits and problems of the dictionaries that we have at our disposal. So it will be nothing new to ask yet again, in brief, what we do, in methodological terms, to unravel the meaning of a word. Apart from the obvious, and probably the most important, which is to go back to the literary source or sources from which the word has been culled and look at it in context, we usually start with our dictionaries. We might also check for cognates in other languages if these exist, which is another round of looking in other dictionaries. In the case of the MT and rabbinic literature we also have a long tradition of commentary which can be found in the Tosefta, Talmudim, medieval commentaries and more. These are all valuable resources and are, on many occasions, useful to the lexicographer. Yet, at the same time, each of these sources has its pitfalls. We know, for instance, of some cases where a medieval commentary or a dictionary entry can spark off a tradition of understanding that can be misleading or even just totally wrong. A good example is the understanding of the term נְחֹשֶׁת in 2 Sam. 22.35. The LXX and the Peshitta are consistent with the Hebrew as both employ words that mean copper. Radak

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(R' D. Kimhi, France, 1160–1235), however, considered in his commentary that this term in fact means ‘a very hard type of iron’. This might explain why the King James Bible translates נְחֹשֶׁת as ‘steel’.

When it comes to technical terms, in our case relating specifically to metallurgy, then we have another level of investigation that has to be carried out. We must make sure that our term makes sense in regards to the specific aspect of technology as we currently know it to be, and secondly, that the aspect of technology that we have decided the term is describing is appropriate to the period of time and geographic location that the source it comes from belongs to; a context that is provided by archaeo-metallurgy. Additionally, one must not neglect to consider the fact that a particular term might acquire new shades of meaning as time goes by and technology changes or develops. Even this is not always the end of the story. There is another aspect that might, to a certain extent, be illustrated by a famous quote from Wittgenstein, who pointed out that:

if a lion could talk, we could not understand him.<sup>1</sup>

One might expect, that with the ancients - who have left a rich literary legacy, evidence for the fact that, indeed, they could talk and write a language that we can just about understand - we would not have the problem that we have with lions, even though, of course, we are of the same species. Nevertheless, in some ways Wittgenstein’s statement has some relevance to what lexicographers do. While translating one language into another, they have also to take into account, especially in terms relevant to technology, the difference in the way that we, in the present, understand, view and conceptualize our environment compared to the way the ancients did in the past. Let us consider, for instance, the contemporary use of the words ‘light’ and ‘colour’. Contemporary science has an added conceptual level that effects the way the relationship between these two words is understood, that is now forever embedded within the ideas these words represent. We have the colour wheel with primary and complementary colours that relate to pigments, as well as the colour spectrum scheme that relates to light. One can find words for blue and red in Aramaic, but not for cyan and magenta. This does not mean that they did not exist and were not observed. Rather it is that our language and that of the

<sup>1</sup>L. Wittgenstein, *Philosophical investigations: The German Text with a Revised English Translation*, II (G.E.M. Anscombe; Malden Massachusetts: Blackwell, 3rd edn, 2001), p. 190.

ancient Aramaic or Hebrew speakers reflect different knowledge from a different era so that a different set of concepts are appropriately associated with each of them.

This principle is, of course, also relevant to issues that go beyond technology and can be related to various aspects of life. Yet, within the context of metallurgy, at least, it is appropriate to say that our language is linked to modern scientific and technological concepts, whereas the ancients derived theirs from what was a hands-on experience, a familiarity with what at that time people knew about materials and what they observed about technique around them. For instance, a smith refining silver did not know about all the elements he was dealing with, and often even got rid of several which he did not even know existed in the piece of material he was refining. When we talk about copper ore, for instance, we know that as a substance it is made up of smaller particles that we call atoms. We know that this ore consists of copper particles (atoms) that are joined to particles of oxygen, sulfur, and others. Although most people might not know the exact chemical structure, or not even know it at all, they are likely to have some idea of the fact that materials are made of various types and combinations of atomic particles. So when we, even as lay people, think of smelting, that is extraction of metal from ore, we think of a process that results in the separation of the copper particles from all other non-metallic ingredients of the ore.<sup>2</sup>

Even though the ancients, already from before the onset of written language, had the ability and knowledge, gained by a very long process of trial and error, to extract various metals from rock ores, something of the way in which they rationalized this process is naturally encapsulated in the way their language was formed. As such, the associations and concepts that are linked to their words will be different from those that are attached to ours. It is worth recalling that there is no word for ore in Aramaic, nor for that matter a generic term for metals in any of the Middle and Late Aramaic dialects, Biblical Hebrew or Classical Greek.<sup>3</sup>

<sup>2</sup>The primary copper smelting product often also contains unwanted metal, like iron, which after smelting has to be separated from the copper by a refining process.

<sup>3</sup>For a discussion relating to the appearance of the Hebrew term *מַתְּכָה* in the Mishna, and Deut. 31.22, 23 as a lexical definition of 'metals' see D. Levene and B. Rothenberg, 'רַא בְּרֵאשִׁי—A fundamental Aspect of the Nature of Metal', *Journal for the Aramaic Bible* 2 (2000), pp. 75-87.

As our work has been concerned with the OT, its Aramaic Versions and late antique to medieval rabbinic literature, there has been an overlap within it between Hebrew and Aramaic. In this paper we shall present two cases. The first will concentrate on certain meanings of the Hebrew term צָרַף in Biblical Hebrew and Mishnaic Hebrew with some reference to its Aramaic and other cognates. This is a case where we can trace and define the changes in the word's use and try to explain its semantic evolution. The second case relates to the term צָרַךְ that occurs in Amos. This case illustrates in more extreme form some of the problems we have just discussed. Yet, here there are shifts in the term's meaning that are more difficult to explain.

## 2. צָרַף

In the MT צָרַף appears in 22 instances as a verb,<sup>4</sup> 10 of which are specifically connected with silver.<sup>5</sup> One of the first things that we have asked ourselves is why the dictionary entries include 'smelt' in their definitions of this verb.<sup>6</sup> Our problem with this definition is simple, since what we find described in the Biblical texts is cupellation as a refining process and not smelting. Furthermore, we know of no evidence of silver smelting in the whole of the Levant. As we shall see from looking at this process of cupellation, it is understandable why it was favoured as a simile. The best Biblical example, which in fact describes cupellation, is Jer. 6.29-30:

נחר מפח מאשתם עפרת לשוא צרף צרוף ורעים לא נתקו כסף נמאס קראו להם  
כי מאס יהוה בהם

29 'The bellows puff, the lead is consumed by fire, the cupellation/silver refining is to no avail, the impurities/dross is not removed.

30 Call them 'reject silver', for YHWH has rejected them.

Jer. 6.29-30 is one of those rare instances where we have a clear technical description of what the verb in question, i.e., צָרַף, means.

<sup>4</sup>Judg. 7.4; 2 Sam. 22.31; Isa. 1.25; 48.10; Jer. 6.29; 9.6; Zech. 13.9; Mal. 3.2,3; Ps. 12.7; 17.3; 18.31; 26.2; 66.10; 105.19; 119.140; Prov. 30.5; Dan. 11.35; 12.10.

<sup>5</sup>Isa. 48.10; Jer. 6.29; Zech. 13.9; Mal. 3.2,3; Ps. 12.7; 66.10; Dan. 11.35; 12.10.

<sup>6</sup>For example Koehler-Baumgartner (*HALAT*, p. 1057) consider the meanings of the verb צָרַף to be 'smelt, refine' or 'sift'; BDB, p. 864a consider it to mean 'smelt, refine' or 'test'. In dictionaries, such as Jastrow (M. Jastrow, *A Dictionary of the Targumim, the Talmud Bavli and Yerushalmi, and the Midrashic literature* [New York: Horeb, 1903], p. 1303), that cover later forms of Hebrew, there also occur the meanings 'melt' and 'smelt' which are both questionable.

*Cupellation*

For this process a special vessel called a ‘cupel’<sup>7</sup> is used, that is, by the way, called **מִצְרָף** in Biblical Hebrew and **צִרְפָּא** in Aramaic (see below). The material that requires cupellation, i.e. a process of separation from unwanted elements and impurities, which could be silver that has been alloyed with copper and other metals, or scrap metal that might include silver inlay or shavings from fettling, is put into a cupel. To this a considerable amount of lead, that acts as a collector of silver, is added. When this mixture is subjected to high temperatures, the molten lead and silver combine and many of the impurities rise to the surface and can be literally skimmed off. The lead containing silver, that is by now molten, is subjected to a stream of air over its surface that causes the lead, and other base metals present as impurities, but not the silver, to oxidize. The liquid oxidized lead, called ‘litharge’, is run off or is absorbed by the cupel material, whilst the silver remains in the cupel. This process is still used, even today, by silversmiths in various countries.<sup>8</sup> The process is well described by H.E. Wulff in his ‘The traditional Crafts of Persia’, from 1966:<sup>9</sup>

... crucibles are used that are lined with a mixture of wood ash, sand and ground potsherds. Lead is melted into the precious metal, and the dross that forms on the surface and contains all the base metal impurities is continually removed by scraping it over the edge of the crucible until the molten precious metal shows a brightly shining surface.

The verse in Jeremiah, that we have quoted above, describes this very process. However, and this is the main point of the metaphor, even though the lead is consumed, the **רְעִים**, the unwanted impurities, are not separated from the silver. The use of cupellation as a metaphor implies quite clearly that this technique was well and widely known. We can see, by the way, that in the Syriac of the Peshitta and the Aramaic of the Targum the use of the root *šrp* is not as extensive as it is in the Hebrew of the Bible. It seems that in many of the references the original metallurgical simile had lost some of its prominence and

<sup>7</sup>A ‘cupel’ is a crucible-like vessel made of clay mixed with bone- or wood ash, or a shallow hearth, lined with ash. The ash was needed to make the vessel/hearth porous enough to absorb the oxidized lead (‘litharge’).

<sup>8</sup>Two examples of images of cupellation are: 1. from early in the second millennium BCE in Egypt in the tomb of Beni Hassan and 2. from the 20th century India, see W. Foy, *Ethnologica* (Leipzig: K.A. Hiersemann, 1909), p. 109.

<sup>9</sup>H.E. Wulff, *The traditional Crafts of Persia* (Cambridge, MA: The M.I.T. Press, 1966), p. 33.

was replaced by more general terms that the translators considered as relevant to the theological sense of the text.

MT	TARGUM	PESHITTA	
צורף	קניי דקניאה	סַמְלָא, סַמְלָא, בְּבִיבֵי זַמְבָּא	silver/gold smith
צרף	סנן דבחר דנתך, מסי דברר דצרף	בַּסָּא, בַּסָּא, בַּסָּא	the use of cupellation
מצרף	צרפא	סַמְלָא בַּסָּא	cupel

It is worth noting that the word מצרף in Hebrew, צרפא in Aramaic, that occurs only twice in the MT (Prov. 17.3, 27.21), is not simply a ‘crucible’ as the dictionaries cite it to be,<sup>10</sup> but, in fact, a ‘cupel’. It would have been recognized as distinct in the material it was made of, its shape and function.

In Mishanic Hebrew we find that the verb צרף, in a metallurgical context, comes also to mean the consequence of the process that we refer to as ‘case-hardening’ or ‘low steel-making’. We find its meaning, literally defined, in a statement in a baraita in b. Yom. 34b:

אם היה כהן גדול זקן או איסמנים וכו' תניא אמר רבי יהודה עשויות של ברזל היו מחמין מערב יום הכפורים ומשילין לתוך צונן כדי שתפיג צינתן והלא מצרף  
 If the high priest was old or of delicate health etc. It was taught: R. Judah said: Lumps of iron were heated on the eve of the Day of Atonement and were cast into the cold water to mitigate its coldness. But was [one] not thereby [case-]hardening them?

The iron object is placed in a high temperature carbon rich environment for a number of hours – in this case from the eve of the Day of Atonement. The surface of the iron absorbs a small amount of carbon that becomes, in essence, a skin of steel. One of the properties of this kind of steel is that when heated to a certain temperature, that can be identified by the colour of the metal, and then quenched in water – in the case of our baraita being cast into the cold water – it becomes a much harder steel surface. This technique was used for producing more effective edges for knives and daggers, ends of chisels, pick-axes and the like.<sup>11</sup> This process was correctly identified and described in the medieval lexical Gaonic commentary to Tohorot ascribed to Hai Gaon, that states in regard to the same term that occurs in m. Mach.

<sup>10</sup>D.J.A. Clines, *The Dictionary of Classical Hebrew*, V. ג-ז (Sheffield: Sheffield Academic Press, 2001), p. 457a; BDB, p. 864b; whereas HALAT, p. 625b considers its meaning to be ‘smelting-pot’.

<sup>11</sup>See D. Levene and B. Rothenberg, ‘Early Evidence of Steelmaking in the Judaic Sources’, *JQR* 92 (2001), pp. 119-22.

5.7 'המוציא מסמר בגשמים לצרפו) (If a nail was taken out into the rain in order to quench it'):

פ' כשהחודד מבקש לעשות סייף או סכין או כל כלי כיוון שיחמו ויעשו כפחמין נוטלן בצבת ונותנו במים והוי צירוף

When the iron-smith wished to make a sword or a dagger or any other utensil, when he had heated it and made it (so to speak) in the charcoal, he would take it with tongs and put it in water, and that is [case-]hardening.<sup>12</sup>

Another occurrence of the use of the term *צָרַף* is found in m. Ket. 7.10. In this passage a number of male professions are listed. The text states that a woman married to a man who is occupied in one of these professions has the right to demand a divorce. The implication of the text is that these professions carry with them serious side-effects that can have a detrimental effect upon marital life and its consummation. The profession that is of interest to us is the *מצרף נחושת*. The Mishna does not elaborate further on the exact nature of this occupation, nor does it employ this term again. Other sources provide more in terms of explanation: in t. Ket. 7.11 we are told, anonymously, that the *מצרף נחושת* is one who melts copper (*מצרף נחושת*); b. Ket. 77a provides two opinions; attributed to R. Ashi is the opinion that it is a fabricator of pots or kettles (*חשלי דודי*), and to Rabbah Bar Bar Hanna the opinion that what is meant here is one who 'cuts copper from its source' (*המחתך נחושת מעיקרו*); whereas, in y. Ket. 7.10 31d Samuel is attributed with stating that the *מצרף נחושת* is one who 'melts copper from its source' (*מתוך נחושת מעיקרו*). Lieberman suggested that one can understand this to refer to a copper smelting worker,<sup>13</sup> as the high sulfur content in many of the ores causes a powerful and unpleasant smell that inevitably attaches itself to him.<sup>14</sup> Such mines where the copper ore is rich in sulfur are known to be very pungent, even decades after they are abandoned.<sup>15</sup> We might add, also, that intensive work with copper ores can, on occasion, cause impotence<sup>16</sup> – another good reason for a wife to demand

<sup>12</sup>J.N. Epstein, *The Gaonic Commentary on the Order of Tohorot Attributed to Rav Hay Gaon* (Jerusalem: Magnes, 1982), p. 128.

<sup>13</sup>S. Lieberman, *Tosefta Ki-Fshutah: A Comprehensive Commentary on the Tosefta. Part VI Order Nashim* (New York: The Jewish Theological Seminary of America, 1967), p. 303.

<sup>14</sup>Rashi explains the repugnance of this trade as relating to its pungent odour (*מפני שאומנות מסרחת היא*).

<sup>15</sup>A very good example is the mine of Rio Tinto, SW Spain, which still has a bad smell from roasting sulphuric ores many generations ago (B. Rothenberg and A. Blanco Freijeiro, *Studies in Ancient Mining and Metallurgy in South-West Spain* (London: IAMS, 1981), pp. 96-108).

<sup>16</sup>Personal communication, Prof Tim Shaw, Imperial College London.

a divorce. As smelting was mainly done at the site of the mines themselves, which we know existed only outside the borders of Israel, either at Feinan or in Capadocia, the implication would be, if we accepted this interpretation, that there were Jewish communities active in those areas in that industry.

The connection between the term *צָרֶף* in the OT that means ‘silver cupellation’ and *מִצְרֶף* in Ketubot that might mean ‘copper smelter’ is, perhaps, not too difficult to surmise, as the concept inherent in the Biblical term might have been appropriated to also represent the extraction of the desired metal from the rock ore. There is, however, another possible interpretation that we can suggest for the term *מִצְרֶף נְחוּשֶׁת* that affords a somewhat closer connection with the refining of silver by cupellation, namely the refining of the primary product of copper smelting that is a very rough ‘ingot’, that is of no use otherwise. Such a rough ingot would contain a lot of slag, iron and if smelted from a sulfuric ore a certain amount of sulfur. Likewise this process would impart to its practitioner a bad smell that was difficult to get rid of, and may also have caused impotency. Such refining could have been done at the mining site, however, there is evidence that such rough ingots of copper were traded to Palestine, probably mainly from Feinan. One such primary ingot was found near Ain Yahav in the Arabah, perhaps lost on the way to Palestine.<sup>17</sup> Although this kind of refining is different from cupellation, represented by the Biblical *צָרֶף*, it is nevertheless a process of extracting a pure metal from a metallic mixture.

The concept of case hardening, that we have seen in b. Yom. 34b, is a bit more complicated to explain in terms of its connection to silver and copper refining. We would, however, argue that there is a connection between these concepts, that reflects the way the ancients understood and rationalized the material properties of the metals they applied this term to. This connection is not immediately obvious to us as we form our understanding of material properties according to the modern sciences of chemistry and physics. To the ancients, on the other hand, cupellation, a pyrotechnic process, that resulted with pure silver is, in a way, comparable to the harder iron, that we know is a steel casing, that also occurs after another type of pyrotechnic process. We assume that the Jewish community of the time of the Mishna considered that this pyrotechnic process brought forth the purer, superior, form of iron.<sup>18</sup> This concept of a purer form of material is, by the way, well

<sup>17</sup>The ingot was found in the 50s at Ain Yahav, a spring in the Arabah, and was cut into several pieces by the person who found it and presented to Ben Gurion and other public personalities as ‘Copper from King Solomon’s Copper Mines’. Some pieces of the ingot reached the Antiquities Authority in Jerusalem, one section of the ingot is exhibited in the Nehushtan Pavilion at the Eretz Israel Museum, Tel Aviv.

<sup>18</sup>For, as we know, there is no word for steel in Hebrew or in Jewish Aramaic till



known from ancient Egyptian, where various minerals and materials have, in addition to their common form, a true or real ‘maa’ form.<sup>19</sup> To conclude we would say that the basic meaning of צַרְרִי is any kind of change/improvement in the quality of a metal, that is achieved by a pyrotechnic process. This term can, however, have different detailed meanings in the different periods and for the different metals.

For the purpose of comparison we provide the reader with some dictionary entries with meanings of the verb צַרְרִי in metallurgical contexts and others that seem relevant.<sup>20</sup>

1 Koehler-Baumgartner: 1. To smelt; 2. To refine<sup>21</sup>

2 Ben Yehuda (Hebrew): 1. To purge; 2. To fit tightly<sup>22</sup>

3 Jastrow (Biblical Hebrew): 1. To smelt, melt; refine, purify 2. To tighten, harden<sup>23</sup>

4 Jastrow (Aramaic): To smelt, refine, try<sup>24</sup>

5 Black, George, Postgate (Akkadian): Ṣarāpu(m) I ‘to burn, fire; dye (red)’; ‘smelt and refine metal’; ‘fire, bake’ clay tablet, brick; ‘dye’ textiles, ivory, leather, mountain with red (colour), blood etc. ‘Burn (up)’ drug, person in fire; of stomach ‘give burning pain’; of cheeks ‘burn’ with tears; ‘torture’; ‘dye (red)’; ‘make’ stone ‘glow’, ‘be fired; reddened’.<sup>25</sup>

### 3. אַךְ

The second term that we want to look at is אַךְ in the context of the OT, where it occurs four times, all within two verses in Amos. This case is interesting for a number of reasons. It is a hapax legomenon in Biblical Hebrew and occurs in Late Antique Hebrew literature only once again in t. Kel. B. Meṣ. 1.3 (Zuckerman ed. and 1.2 in the Lieberman ed.). Its meaning is contested in the commentaries of both

the medieval period. They knew about steel, but refer to it as a type of iron, Indian iron etc (see Levene and Rothenberg, ‘Early Evidence of Steelmaking’, pp. 105-27). Steel to them would have been the product of some kind of iron refinement.

<sup>19</sup>R.O. Faulkner, *A Concise Dictionary of Middle Egyptian* (Oxford: Griffith Institute Ashmolean Museum, 1988), p. 101.

<sup>20</sup>The Akkadian term in its wider meanings has been added for comparison.

<sup>21</sup>*HALAT*, p. 1057.

<sup>22</sup>E. Ben Yehuda, *A Complete Dictionary of Ancient and Modern Hebrew*, XI (Jerusalem: Hemda and Ehud Ben Yehuda, 1950), p. 5649a and 5651a.

<sup>23</sup>Jastrow, *A Dictionary of the Targumim*, p. 1303b.

<sup>24</sup>Jastrow, *A Dictionary of the Targumim*, p. 1304b.

<sup>25</sup>J. Black *et al.*, *A Concise Dictionary of Akkadian* (2nd edn [‘printing’]; Wiesbaden: Harrassowitz, 2000), p. 334a.

texts. For the purpose of this paper we have decided to look at some of the lexical commentaries that have led this term's occurrence in Amos to be understood at different times in different ways. Regarding this difficult term, we shall show some of the variety of interpretations that has been applied to it.<sup>26</sup> We provide the verses from Amos with two possible translations:

7 כה הראני והנה אדני נצב על חומת אנך ובידו אנך: 8 ויאמר יהוה אלי מה אתה ראה עמוס ואמר אנך ויאמר אדני הנני שם אנך בקרב עמי ישראל לא אוסיף עוד עבור לך

(אנך + plumb line)

This is what He showed me: He was standing on a wall *checked with a plumb line* and He was holding a *plumb line*. And the Lord asked me, 'What do you see, Amos?' 'A *plumb line*', I replied. And my Lord declared 'I am going to apply a *plumb line* to My people Israel; I will pardon them no more'.<sup>27</sup> (JPS)

(אנך + tin)

This is what He showed me: He was standing on a wall of *tin* and He was holding *tin*. And the Lord asked me, 'What do you see, Amos?' 'Tin', I replied. And my Lord declared 'I am going to put *tin* within My people Israel; I will pardon them no more'.

Being a hapax legomenon אנך has, in modern commentary, been considered in the light of its older cognates, most importantly the Akkadian *anāku(m)*, in the context of which the Sumerian *anag* and Indian *nāga* are also always mentioned.<sup>28</sup> There are also cognates in Aramaic, namely ܐܢܟܐ in Syriac and 'nk' in Mandaic. The Arabic cognate apparently means 'lead'. The Ethiopic means either 'lead' or 'tin'.<sup>29</sup>

Biblical Hebrew	Akkadian	Syriac	Mandaic
אנך	<i>anāku(m)</i>	ܐܢܟܐ	'nk'

<sup>26</sup>For a full account of the commentaries on this aspect of Amos see H.G.M. Williamson, 'The Prophet and the Plumb-Line', *Oudtestamentische Studien* 26 (1990), pp. 101-21.

<sup>27</sup>*Tanakh, a New Translation of the Holy Scriptures According to the Traditional Hebrew Text* (Philadelphia: The Jewish Publication Society, 1985)

<sup>28</sup>W. Von Soden, *Akkadisches Handwörterbuch* (Wiesbaden: Harrassowitz, 1965–1981), p. 49b.

<sup>29</sup>M. Ellenbogen, *Foreign Words in the Old Testament, Their Origin and Etymology* (London: Luzac & Company Ltd, 1962), p. 31 and P.V. Mankowsky, *Akkadian Loanwords in Biblical Hebrew* (Winona Lake: Eisenbrauns, 2000), pp. 35-36.

One of the problems is that there is a considerable history of debate concerning whether the Akkadian *anāku(m)* should mean ‘tin’ or ‘lead’, or indeed whether one should see it as being tin in some contexts and lead in others. Landsberger’s notes seem, to our mind, very convincing in that he argues that apart from a very small number of unusual references the term means tin.<sup>30</sup> Landsberger also mentions our verses in Amos, stating his opinion that tin is a relevant concept in this context as it is in fact a symbol of ‘(a) softness, (b) uselessness, unless alloyed with another metal [and] (c) perishability’.<sup>31</sup> More recently Moorey recounts Landsberger’s ‘magisterial’ article, with the cautionary note that there are still questions concerning the meaning of the Akkadian term, but only in respect to the period of the second half of the second millennium BCE.<sup>32</sup> This would discount the period of Amos as it is supposed to have been composed in the first half of the first millennium BCE. It is worth noting that another cognate, largely ignored in this context, exists in Egyptian.<sup>33</sup> This too is a hapax legomenon and is found in an inscription from Kawa (Upper Egypt) that states that in his 5th year, Taharqa, the Kushite pharaoh of the 7th century BCE (25th dynasty 690-664 BCE),<sup>34</sup> made a tribute to the temple of Gematen of (amongst other things) a mineral named *inzwḳ mṣ*;<sup>35</sup> *mṣ* being the qualifier commonly added to the names of what were considered as the ‘pure’ form of minerals. This is an interesting attestation as it illustrates how the names of commodities traded over long distances often traveled with the commodities themselves.

It is clear, already from the early versions of the OT, that this term was problematic even then. תַּנְיָא was translated in the LXX as ἀδάμας which was loaned directly into the Pesh. as ܐܕܡܝܫܐ.<sup>36</sup> It is worth not-

<sup>30</sup>B. Landsberger, ‘Tin and Lead: The adventures of Two Vocables’, *JNES* 24 (1965), pp. 285-96.

<sup>31</sup>Landsberger, *Tin*, p. 287.

<sup>32</sup>P.R.S. Moorey, *Ancient Mesopotamian Materials and Industries: The Archaeological Evidence* (Oxford: Clarendon, 1994), p. 295.

<sup>33</sup>J.R. Harris, *Lexicographical Studies in Ancient Egyptian Minerals* (Berlin: Akademie Verlag, 1961), pp. 62-63; and J.E. Hoch, *Semitic Words in Egyptian Texts of the New Kingdom and Third Intermediate Period* (Princeton: Princeton University Press, 1994), p. 26.

<sup>34</sup>Taharqa is mentioned twice in the Bible, 2 Kgs 19.9 and Isa. 37.9, as the king of Kush who came in aid of Hezekiah against Sanherib. In the Bible his name is misspelled Tarhaqa.

<sup>35</sup>M.F.L. Macadam, *The Temples of Kawa, I. The Inscriptions* (London: Oxford University Press, 1949), p. 11 n. 27.

<sup>36</sup>See A. Gelston, *The Peshitta of the Twelve Prophets*, (Oxford: Clarendon Press,

ing in this context that the meaning of the word *'admws*, like *'nk*, is not quite clear. Liddell & Scott provide two material possibilities: 1. the hardest metal, prob. *Steel*; and 2. *diamond*.<sup>37</sup> The Syriac ܐܕܡܘܨ is used in early Syriac literature and is often equated with stone rather than steel. For instance, Ephraem uses it in the sense of 'stone' as one of the representations of Christ with specific reference to our verse in Amos.<sup>38</sup> On the other hand we have a Syriac magic bowl that was published by Naveh and Shaked (bowl no.1) in which the term ܕܘܠܘܬܐ ܕܥܝܪܐܢܐ occurs, which they argue means 'wall of pure steel'.<sup>39</sup> Their argument hinges mainly on two facts: 1. the occurrence in another bowl (Montgomery 4.6<sup>40</sup>) of the expression ܘܫܘܪܐ ܪܒܐ ܕܢܚܫܐ 'a great wall of copper (alloy)', which points to ܕܘܠܘܬܐ being like ܢܚܫܐ, i.e. a metallic substance; and 2. the Manichean Middle Persian term *'rm's* that means 'steel'. We would note that the Greek term *ἄδάμας* is cited in Liddell Scott-Jones in texts that go back to the 8th century BCE, and would thus hesitate to assume a meaning of steel for such an early date. Although the evidence of case hardening begins to appear at this period,<sup>41</sup> it is well over a millennium before steel is produced in the West. Furthermore, Greek has a separate word for 'case hardening' *στόμωμα*.<sup>42</sup> A meaning of tin-bronze as the hard metal that *ἄδάμας* stands for might be more appropriate.<sup>43</sup> Indeed, Daniel Alqumsi, the Medieval Karaite exegete, understood the term ܕܘܠܘܬܐ to be suggestive of

1987), p. 164, where he states that 'In Amos 7.7-8 the word ܕܘܠܘܬܐ is uniformly rendered ܐܕܡܘܨ, a loan-word from the very Greek term used here in LXX', which is, incidentally, the only place this word appears in the Pesh. (M.P. Weitzman, *The Syriac Version of the Old Testament: An Introduction* (Cambridge: Cambridge University Press, 1999), p. 77).

<sup>37</sup>LSJ, p. 20a.

<sup>38</sup>R. Murray, *Symbols of Church and Kingdom* (Cambridge: Cambridge University Press, 1975), p. 210.

<sup>39</sup>J. Naveh and S. Shaked, *Amulets and Magic Bowls* (Jerusalem: Magnes Press, 1985), pp. 131-32.

<sup>40</sup>J.A. Montgomery, *Aramaic Incantation Texts from Nippur* (The Museum, Publications of the Babylonian Section, 3; Philadelphia: University of Pennsylvania., 1913), p. 133.

<sup>41</sup>T. Stech-Wheeler *et al.*, 'Iron in Taanach and early Iron Metallurgy in the Eastern Mediterranean', *AJA* 85 (1981), pp. 245-68; W. Rostocker and B. Bronson, *Pre-Industrial Iron: Its Technology and Ethnology* (Archeomaterials monograph, 1; Philadelphia: no publisher, 1990), pp. 207-10.

<sup>42</sup>Levene, 'Early Evidence', p. 119.

<sup>43</sup>See H.W. Wolff, *Joel and Amos: A Commentary on the Books of the Prophets Joel and Amos* (trans. W. Janzen *et al.*; Philadelphia: Fortress Press, 1977), p. 294 for the suggestion that the LXX *ἄδαμαντίνου* stands for brass.

a hard metal.<sup>44</sup> The medieval commentators Rashi and Radak cite the Arabic cognate to *'nk*, to suggest the meaning plumb line. Needless to say that their commentary has been, and still is, very influential. One might argue that an understanding of the Akkadian cognate in the sense of 'lead' could be taken in support of their interpretation of the Biblical term. Though, as Williamson points out, the occurrence of אבן הבריל in Zech. 4.10 could be used to support the meaning of 'plumb-line' in Amos as בריל = tin = אַך.<sup>45</sup>

The evidence we have cited suggests that our term had a 'lexical vulnerability' in that it shows, at least in terms of our understanding, different meanings that manifest themselves over time and across language barriers.

The principle of hardness that links all the meanings of ἀδάμας and its cognates at all times and in all languages, might have a semantic connection with *'nk* as meaning 'tin', in that tin was the metal that mixed with copper produced bronze, a metal that became the hardest in its time; an alloy that was incredibly versatile in the ways that it could be manipulated; and also a metal that was much more resistant to corrosion than copper or iron.

#### 4. Conclusion

It was our intention to present in this article an insight into the lexicographical aspects of our investigations of the metallurgically related material in the biblical and early to Medieval rabbinic literature. We chose two different terms, צַרְף and אַך, to exemplify more acutely some of the difficulties inherent in this endeavor. These examples were selected to illustrate the need for a cross-disciplinary approach, in this case philology and archaeometallurgy, as a prerequisite for dealing with this type of terminology. In the case of the terms derived from the root צַרְף, that we have looked at, it is important to note that the bridge between the various meanings that are found amongst its various cognates (see table above), and meanings that are possible in terms of archaeometallurgical probability, is not always clear. We have shown that, technically speaking, the meaning of the term in b. Yom. 34b and

<sup>44</sup>D. Alqumsi, פירוש להרי עשר: פירוש שנים עשר (ed. I. D. Markom; Jerusalem: מקיצי נרדמים, 1947), p. 37. Alqumsi suggests that the allusion in Daniel is to an impregnable wall and that אַך is 'hard lead' (עפרת החוקה), or 'lead and tin' (אלרצאין) - possibly a type of pewter.

<sup>45</sup>Williamson, 'The Prophet', p. 111.

Hai Gaon's commentary to Machsh. 5.7 is 'case-hardening'; whereas, in Jer. 6.29-30 it means 'cupellation'. A note of caution must be drawn from the fact that both 'case-hardening' and 'cupellation' are modern terms. The meanings of the term *šrp*, in its oldest cognates (see table above) do, however, include 'heat', 'fire', 'burning', 'baking' and the colour 'red' - meanings that are well suited to describe aspects of the processes of 'case-hardening' and 'cupellation' as they would have been known to the contemporaries of the authors of the texts we have investigated, and are fitting associations with the aforementioned metallurgical processes, that might explain the reason why *šrp* evolved to describe them. The term 𐤑𐤏, as it is used in Amos, presents a different kind of problem. It is a unique attestation in Biblical Hebrew in a text that does not give a clear indication of its precise meaning. Indeed, there is a long tradition of disagreement about this issue, starting from the early versions, through to Medieval and modern commentaries. The difficulties with deciphering this term are exacerbated by the fact that there is even controversy about the meaning of its older cognates in the various Akkadian dialects. Although uncertainty prevails as to its specific meaning in Amos, we can, nevertheless, observe, through its investigation, how a technical term can traverse various languages and generations. One might add that tin, one of the possible meanings of 𐤑𐤏, was a metal that, though common enough, was not regularly used on its own. Rather, it was used within alloys or as a coating of other metals. Thus, direct contact with it would have been relatively rare. These considerations might explain some of the confusion surrounding this term's various possible meanings.

## ABSTRACTS

PETER J. GENTRY, Propaedeutic to a Lexicon of the Three: The Priority of a New Critical Edition of Hexaplaric Fragments.

This investigation of the marginal notes in the Syro-Hexapla of Ecclesiastes delineates the role of the text history of the O(ld) G(reek) in determining the text of the Three (Aquila, Symmachus, and Theodotion), the relation of the Three and the Old Latin in the text history of the OG, and the role of the Three in determining the text of the OG. The implications for a new critical edition of the Three are elaborated as well as for the lexicography of the Three.

GILLIAN GREENBERG, Indications of the Faith of the Translator in the Peshitta to the 'Servant Songs' of Deutero-Isaiah.

The Peshitta of Deutero-Isaiah includes several passages relevant to the question of the faith of the translator: Jewish or Christian? There are inconsistencies: some differences between MT and P suggest a Christian or messianic nuance; one blunts an anti-Jewish phrase; in another an opportunity to introduce a Christian theme is resisted. The cumulative weight of examples suggests Christian input. The inconsistency could be explained by postulating a Jewish-Christian translator who attempted to play fair by his Vorlage, putting his own convictions and religious literature to the back of his mind, but occasionally failed.

DAN LEVENE AND BENO ROTHENBERG, Word-Smithing: Some Metallurgical Terms in Hebrew and Aramaic.

The collaboration between Dr Dan Levene and Prof. Beno Rothenberg on a project that aims to identify references to metals and metalworking techniques in what are primarily Judaic sources has been a bringing together of two different approaches to studying the past: philology and archaeometallurgy. This paper highlights the way in which the lexicography of certain terms must inevitably rely on knowledge of the relevant technology and its history. To illustrate this point two terms

are examined: 1. the word *šrp* (ܫܪܦ) and the shifting meanings of some of its cognates across time; and 2. the word *'nk* (ܢܟ), that appears in Amos 7.7-8.

MATTHEW MORGENSTERN, Notes on a Recently Published Magic Bowl.

This article presents a new transcription and translation of the Aramaic magic bowl BM 135563, and suggests an interpretation that differs considerably from the previous editions. It is argued that the bowl presents a narrative is that more coherent than has been suggested, and that it is the product of carefully considered literary activity.

HARRY SYSLING, Three Harsh Prophets: A Targumic Tosefta to Parashat Korah.

In MS Paris of the Fragmentary Targums one finds lengthy introductions to the festival readings and also to the weekly sabbath readings. In one of these introductions (to Numbers 16.1ff.) a story is told about three prophets who denied their own prophecies, namely Moses, Elijah and Micah. This story is of special interest because of the quotations it contains of scriptural verses from the Prophets that are at variance with the official targum on the Prophets. The article offers a detailed analysis of the story and discusses its date and origin by comparing it to the extant parallels in rabbinic sources.

WIDO VAN PEURSEN, The Peshitta of Ben Sira: Jewish and/or Christian?

The religious context in which the Syriac translation of the Bible originated is a much-debated issue. Some scholars argue that it originated in a Jewish context, others that it has a Christian background. Also various hypotheses about a Jewish-Christian origin have been put forward. This paper argues that the question 'Jewish or Christian?' and even the question 'Jewish, Christian, or Jewish-Christian?' is an oversimplification of the problem because of the broad Jewish-Christian spectrum that existed in the first centuries of the Common Era. The paper concentrates on the Syriac translation of Ben Sira, which has some undeniable traces of an origin somewhere on the Christian side of the spectrum.