

# Emery abrasive in the lapidary craft of the Ur III period? Some further remarks on the stone ú-na<sub>4</sub>-gug and its Old Babylonian counterpart<sup>1</sup>

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[The aim of this paper is to discuss whether emery abrasive had already been used in the lapidary craft of the Ur III period or it was an innovation taking place in the following Old Babylonian period, when hard stones became more commonly utilised. First, attention will be drawn to six Ur III administrative documents containing the unusual stone name ú-na<sub>4</sub>-gug. Then, the Old Babylonian attestation of the stone called na<sub>4</sub>ú and its relevance to the Ur III material will be discussed. As it will be argued, both stone names represent the same context: the use of emery abrasive by the lapidaries of Ancient Mesopotamia.]

**Keywords:** Ur III period, administrative texts, Lugale, stone cutting, gemstones, emery abrasive.

## 1. Introduction

1.1. As everyday procedures and objects were seldom explained explicitly in cuneiform texts, it is always difficult to find adequate answers when dealing with something what appears to have been looked upon as common by Ancient Mesopotamian peoples. This is also the case regarding the craft of stonecutting to which references can be found in many texts of different genres, but its methods, equipment and working materials can be reconstructed only partially.<sup>2</sup> The always-remaining problem of information missing from the reconstruction is, however, only one aspect, in addition to which it should also be noted that sometimes even the existing philological evidence turns out to be hard to understand. As Moorey has written in his book *Ancient Mesopotamian Materials and Industries* “for the moment too many words for materials and objects remain untranslated. Numerous words are known only from lexical lists, where there is little, if any, evidence for their precise meaning” (Moorey 1994: 14).

1.2. The present paper does not try to give an exhaustive description of the ways stones were cut, but concentrates only on one particular area of the stonecutting craft: the use of a certain material as abrasive. In regard to the Old Babylonian period, both archaeological and philological investigations are known,

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2. For the stonecutting craft in Ancient Mesopotamia, see CAD G, pp. 138-139; Salonen 1970: 231-244; Loding 1981; Moorey 1994: 21-110; Berlejung 1998: 124-131.

showing that emery, a substance of extreme hardness (Mohs 9),<sup>3</sup> was used as abrasive.<sup>4</sup> First, emery was crushed into small pieces and mixed with some kind of oil or water, then this mixture was smeared on the surface of the stone so that it would be between the head of the drill and the area of the stone needed to be pierced. This way, the whole procedure of cutting became more effective, especially in the case of hard stones like hematite, which was the main raw material of cylinder seals in the first half of the second millennium BCE. The question discussed is whether the same method can be traced back to the Ur III period or it was employed only from the Old Babylonian period onwards, when harder stones became more commonly utilised. It will be argued, that already in the Ur III period emery abrasive was used by lapidaries, although, unlike in the case of the Old Babylonian evidence, there are only a handful of texts containing the word *ú-na<sub>4</sub>-gug* that can prove this statement.

1.3. The word *ú-na<sub>4</sub>-gug* occurs in six texts coming from Ur, and it is not attested in other corpora of Ur III sources. Maybe this is the reason why it was least understood in the secondary literature. It was discussed by Loding (1974: 99; 1981:12) who related it to *ú-babbar*, “white plant”, and tried to make sense of it in the context of glass making. The possibility that *ú-na<sub>4</sub>-gug* was used in glass making was also suggested by Molina (1988: 232-233), who identified this expression with the coral. On the other hand, Molina quoted passages from *Ur<sub>5</sub>-ra XVI* and from the epic *Lugale*, supposing that *ú-na<sub>4</sub>-gug* had something to do with <sup>na4</sup>ú, a stone mistakenly identified by van Dijk (1983 [I]: 104) as “*pierre calcaire dure*” and reinterpreted only later as the word denoting emery abrasive.<sup>5</sup> The possibility of relating *ú-na<sub>4</sub>-gug* to the Old Babylonian stone name <sup>na4</sup>ú was further explored by Reiter (1997: 123-124, 130-134), who compared the six Ur III texts with the Old Babylonian evidence and came to the conclusion that the two words reflect one and the same context: the use of emery abrasive in stone cutting. Thus, it must be noted that most of the points presented in this paper have already been made by Reiter. The reason why the paper still deals with this question is that its argumentation partly differs from that of Reiter’s and some further remarks will also be made that reinforce her conclusions.

1.4. In the second part of the paper the six Ur III documents containing the expression *ú-na<sub>4</sub>-gug* are presented in transliteration and translation. The third part deals with the relationship between the expressions *ú-na<sub>4</sub>-gug* and <sup>na4</sup>ú. In this section it will be argued, that the two terms belong together and therefore it is reasonable to believe that already in the Ur III period lapidaries employed emery abrasive. The paper ends with a conclusion and an appendix in which the Old Babylonian evidence is presented.

## 2. Texts

### 2.1. Text 1: UET III 494 (IS 15.05.16)

CDLI No. P136816

BDTNS No. 010799

1/2 ma-na a-gar<sub>5</sub>

1/2 mina lead,

1/2 ma-na *ú-na<sub>4</sub>-gug*

1/2 mina *ú-na<sub>4</sub>-gug*

mu alan lugal tuš-a <sup>na4</sup>za-gìn tur

for the small lapis lazuli statue of the king sitting.<sup>6</sup>

3. The hardness scale of minerals was established in 1812 by Friedrich Mohs on the basis of the facial scratch resistance. This means, the harder a mineral is, the higher number it has on the scale and it can scratch the surface of all other minerals with lower Mohs hardness number.

4. See Gwinnett, Gorelick 1987 and Heimpel *et al.* 1988. For the summary of their results, see Moorey 1994: 82, 108.

5. See Durand 1983: 136 n. 41; Heimpel *et al.* 1988. For the symbolic meaning of emery abrasive, see Simkó 2013; 2014: 115-117.

6. Another possible translation of the line is “für das Sitzbildnis des Königs, (eingelegt mit) kleinen Lapislazuli(-Stücken)” (Reiter 1997: 123).

2 1/2 gín sù-GAN	2 1/2 mina borax <sup>7</sup>
mu eme ġiš-gíd-da-šè	for the blade of a spear.
2 ma-na 13 gín urudu	2 mina 13 shekels copper
mu <sup>ġiš</sup> šu-kár zadim-šè	for the equipment of the stonecutter.
1 ma-na 15 gín urudu	1 mina 15 shekels copper
luh-dè	is to be refined.
ki diġir-su-ra-bí-ta	From Ilsu-rabi
a-hu-wa-qar šu ba-ti	Ahu-waqar accepted.
iti ki-siki <sup>d</sup> nin-a-zu u <sub>4</sub> 16 ba-zal	The month of young Ninazu, 16 days passed.

2.2. *Text 2*: UET III 520 (IS 15.07.05)

CDLI No. P136842

BDTNS No. 010825

5/6 ma-na 6 gín ú-na <sub>4</sub> -gug	5/6 mina 6 shekels ú-na <sub>4</sub> -gug
mu alan lugal tuš-a <sup>na4</sup> za-gìn-šè	for the lapis lazuli statue of the king sitting.
ki diġir-su-ra-bí-ta	From Ilsu-rabi
a-hu-wa-qar	Ahu-waqar
šu ba-ti	accepted.
iti á-ki-ti u <sub>4</sub> 5 ba-zal	The month of Akītum, 5 days passed.

2.3. *Text 3*: UET III 685 (IS 16.08.10)

CDLI No. P137007

BDTNS No. 010990

5 ma-na ú-na <sub>4</sub> -gug	5 mina ú-na <sub>4</sub> -gug
mu kíġ didli-šè	for specific works.
ki diġir-su-ra-bí-ta	From Ilsu-rabi
a-hu-wa-qar	Ahu-waqar
šu ba-ti	accepted.
iti ezem <sup>d</sup> šul-gi u <sub>4</sub> 10 ba-zal	The month of Šulgi's festival, 10 days passed.

2.4. *Text 4*: UET III 695 (IS 16.00.00)

CDLI No. P137017

BDTNS No. 011000

1 ma-na 18 gín [ ... ]	1 mina 18 shekels ... ,
13 gín <sup>na4</sup> ZA.[ ... ]	13 shekels ... stone,
1 1/2 ma-na ú-na <sub>4</sub> -gu[g]	1 1/2 mina ú-na <sub>4</sub> -gug
mu <sup>ġiš</sup> gu-za zà-bi-[ús] <sup>d</sup> inana-šè	for Inana's throne armrest. <sup>8</sup>

7. For the meaning "borax", see Waetzoldt, Bachmann 1984: 18; Sallaberger 1999: 321. In addition, the word sù-GAN was also equated with the following materials: 1. antimony (Legrain 1912: 84 n. 1; Contenau 1915: 15-16; Limet 1960: 57; Sjöberg 1962: 258; Grégoire 1970: 184; Oppenheim *et al.* 1970: 121; Neumann 1987: 72 with n. 351; Sigrist 1990: 26 *ad* No. 560); 2. electrum (Civil 1964: 7-8); 3. lead (Limet 1960: 57); 4. a type of copper (Snell 1982: 232); 5. arsenic (Limet 1960: 57); 6. slag, by-product of bronze making (Contenau 1915: 15-16; Hallo 1963: 140); 7. zinc or zinc oxide (Thompson 1936: 77; Legrain in UET III, p. 211 *ad* No. 309); 8. pulverized charcoal (Waetzoldt, Bachmann 1984: 13-14). For the summary of earlier literature, see also Limet 1960: 55-56; Loding: 1974: 122-124; Reiter 1997: 327-333.

8. See now Molina 2014: 114 (personal communication with the author [14.01.2015]).

ki ur-še-íl-la-ta                      From Urše-ila  
[ ... ]                                      ...

2.5. *Text 5*: UET III 1267 (?)

CDLI No. P137592

BSTNS No. 011572

[ ... ] ma-na <sup>na4</sup> za-gìn	... mina lapis lazuli,
[x] 5/6 ma-na na <sub>4</sub> -ú-gug	x 5/6 mina ú-na <sub>4</sub> -gug,
[ ... ] <sup>na4</sup> nir <sub>7</sub> -igi [ ]	... nir <sub>7</sub> -igi stone ...
ki-lá-bi 2 gín [ ]	its weight is 2 shekels

2.6. *Text 6*: UET III 1498 v 20-27 (IS 15.12.00)

CDLI No. P137823

BDTNS No. 011803

8 ma-na 2 gín ú-na <sub>4</sub> -gug	8 mina 2 shekels ú-na <sub>4</sub> -gug,
1/2 ma-na a-gar <sub>5</sub>	1/2 mina lead,
ki diġir-su-ra-bí-ta	from Ilsu-rabi.
[ ... ]-nu <sub>11</sub> -gal	alabaster <sup>?</sup>
[ ... ]	...
[ ... ]	...
ki šu-[ ... ]-ta	from Šu-...
é zadim	The workshop of the stonecutter.

2.7. *Commentary*

2.7.1. Personnel

In the texts two persons, Ilsu-rabi and Urše-ila, are mentioned who delivered the raw materials to Ahu-waqar, the šabra and over-all supervisor of the workshop.<sup>9</sup> Out of the two deliverers, Ilsu-rabi's activities are better attested.<sup>10</sup> As one of the four major suppliers of the workshop, his activities included the delivery of ivory to the tibira,<sup>11</sup> usually defined as sculptor in the secondary literature,<sup>12</sup> and that of stones and copper to the lapidaries (zadim),<sup>13</sup> as well as to the metalworkers (kug-dím, simug).<sup>14</sup> Although his name is less attested, the texts prove that Urše-ila also dealt with the same materials.<sup>15</sup>

9. For Ahu-waqar, see Loding 1974: 149-154.

10. For Ilsu-rabi, see Loding 1974: 192; Neumann 1987: 44.

11. According to Loding (1974: 192 n. 41), the texts are UET III 757, 760, 761, 763, 764, 765, 766, 767, 768, 769, 770, 771. Note also UET III 567, where the materials delivered by Ilsu-rabi to the workshop of sculptors are lâl-hur ("modelling wax" [Civil 1964a: 74-75] or "honeycomb" [Sallaberger 2012: 301]) and silver.

12. Since the tibira's area of responsibility included working with a great variety of materials (ivory, metal, wood, stone), it is difficult to find a one-word translation. The proposed definitions are "metalworker" (AHw II, p. 929; Salonen 1970: 97; Rubio 1999: 4), "sculptor" (Heimpel 1987: 54; Neumann 1987: 35 Anm. 87; Waetzoldt 1997: 91; Cavigneaux, Al-Rawi 1995: 30, 38; Sallaberger 1999: 277), "woodcarver" or "inlay maker" (Waetzoldt 1997: 91), "cabinetmaker" (Salonen 1963: 272; Frankena 1974: 111) and "stonecutter" (Salonen 1970: 97; Berlejung 1998: 124-125). In regard to the Old Sumerian and Old Akkadian sources, see also Westenholz's definition of tibira as the craftsman "who did finer works in wood and base metals, such as carving, chasing, and casting of small objects, as distinguished from the carpenter (*nagar, nagāru*) and the blacksmith (*simug, nappāhu*) who did the coarse jobs" (Westenholz 1987: 360).

13. According to Loding (1974: 192 n. 41), the texts are UET III 494 (see §2.1.), 520 (see §2.2.), 542 (the stone name is illegible), 586 (saġ-gir<sub>11</sub>-mud stone), 685 (see §2.3.), 924 (bu-uz-hi-li stone).

### 2.7.2. Profession

Texts §2.1. and §2.6. explicitly show that stonecutting was the profession to the realm of which the ú-na<sub>4</sub>-gug belonged. While §2.1. refers to the lapidaries' equipment (<sup>é</sup>š<sub>u</sub>-kár zadim), the big summary document discussed here as text §2.6. lists ú-na<sub>4</sub>-gug among the last items delivered to the stonecutting workshop (é zadim).

### 2.7.3. Working materials and finished products

Lapis lazuli, a gemstone of considerable hardness, appears in §2.1., §2.2. and §2.5. While the first two texts also define the finished products, which were statues depicting the seated king, §2.5. is too fragmentary for the reconstruction of the product. However, this latter text is also of importance, since it mentions the nir<sub>7</sub>-igi stone as a further working material. The nir<sub>7</sub>-igi stone may be identified as a bead that was cut out of agate in the form of an eye,<sup>16</sup> and as such, it is another hard gemstone that appears in connection with ú-na<sub>4</sub>-gug. In addition to these two hard stones, §2.1. and §2.6. also refer to lead (a-gar<sub>5</sub>)<sup>17</sup> that, as it will be shown, played a particular role in the stone working craft.

## 3. The Old Babylonian evidence and its relevance to the Ur III sources

3.1. Molina (1988: 233) has already considered the possibility that ú-na<sub>4</sub>-gug may be related to another stone name, <sup>na4</sup>ú, attested mostly in Old Babylonian sources. At that time, however, there was only van Dijk's (1983 [I]: 104) interpretation of <sup>na4</sup>ú denoting a hard mineral of the calcite type, which turned out to be inaccurate. Later the stone name was discussed in detail by Heimpel (et. al. 1988), who proved successfully that it referred to emery used as abrasive material by the Old Babylonian lapidaries.<sup>18</sup> Following the conclusions of Reiter (1997: 123-124, 130-134), it will be argued in the following paragraphs that the sources leading Heimpel to this conclusion, the epic *Lugale* and 11 administrative texts from Mari (Heimpel et al. 1988: 201),<sup>19</sup> show similarities to the above presented Ur III texts and thus an equation of <sup>na4</sup>ú with ú-na<sub>4</sub>-gug can be suggested, on the basis of which the possibility of emery abrasive being used in the Ur III stone working craft should be taken into consideration.

3.2. The emery abrasive was of particular significance in the lapidary craft, because it enabled the craftsmen to cut very hard stones. As the experiments conducted by Gwinnett and Gorelick (1987) have shown, stones having a hardness of Mohs 6 like hematite, or greater could not be drilled without it, even if copper or bronze drills were used. This aspect of the material appears to be referred to in the *Lugale* epic,

14. According to Loding (1974: 192 n. 41), the texts are UET III 429, 432, 486, 526, 537, 550, 615. Note also UET III 450, where sù-GAN ("borax") was delivered by IIsu-rabi to the metalworkers.

15. UET III 683 (material is unknown), 684 (kà-li-im), 688 (copper), 695 (the stone name is illegible), 827 (ivory). For Urše-ila, see Loding 1974: 195; Neumann 1987: 45.

16. See Schuster-Brandis 2008: 436-437.

17. For a-gar<sub>5</sub> and its variant a-bár meaning "lead" in the third millennium and the first half of the second millennium, see Limet 1960: 54-55; Landsberger 1965; Civil 1973: 60; de Maaijer, Jagersma 1997/98: 280-281; Reiter 1997: 119-120; PSD A/I, pp. 81-82. The word is not to be confused with a-gar<sub>5</sub>-gar<sub>5</sub> that has been identified as "(refined) copper" (Waetzoldt, Bachmann 1984; Reiter 1997: 121-122; Civil 2008: 87 ad l. 143). Note furthermore UET III 310 and TIM 7 192 for <sup>urudu</sup>a-bár, as well as TCL 5 6037 v 34 for a-gar<sub>5</sub><sup>urudu</sup>. In both cases, urudu is to be defined as a determinative with the meaning "(non precious) metal" (Limet 1960: 36; Reiter 1997: 120, 122; PSD A/I, p. 82).

18. See also §1.2. and §1.3.

19. The texts §5.1.1., §5.1.9., §5.1.14. and §5.1.15. were not known to Heimpel; their importance was realised by Reiter (1997: 131-132). In addition, Reiter (1997: 131 n. 71, 135-142) raised the possibility that three further texts (ARMT 25 315, 428 and 429) may be interpreted in the same context in spite of the fact that they mention only lead without emery abrasive.

too, describing the orders given by Ninurta to the different stones.<sup>20</sup> Accordingly, the god not only wanted the <sup>na4</sup>ú to be used in stonecutting, but he specified the type of the stone, on which it had to be applied (§5.2.3.). This was the carnelian (<sup>na4</sup>gug), one of the hardest stones (Mohs 7) known to the peoples of Ancient Mesopotamia, who, nevertheless, used it very frequently together with lapis lazuli, as gemstones *par excellence* for beads and cylinders seals. The close relationship between the abrasive and the carnelian is expressed more explicitly in the epic in such a way that <sup>na4</sup>ú receives a new name referring to its capability as the cutter of carnelian. This new name is “The one who crushes the whole carnelian”, or in the bilingual recension of the text: “The one who pierces the carnelian” and “Carnelian in piercing” (§5.2.2). It does not seem to be coincidental that the discussed Ur III expression, ú-na<sub>4</sub>-gug “plant-carnelian”, consists of the same two words, (<sup>na4</sup>)ú and <sup>na4</sup>gug, that were also treated together in the epic *Lugale*.<sup>21</sup> In fact, it is reasonable to believe, the Ur III texts, just like the epic, defined emery, the material they were dealing with, as the one with the important characteristic that it can cut hard stones. In this respect, the carnelian was used to express this notion, since it was the most frequently cut among the hardest stones known to contemporary people.

3.3. The two stones mentioned along with ú-na<sub>4</sub>-gug in the Ur III texts are lapis lazuli (§2.1., §2.2., §2.5.), and probably agate cut in the form of an eye (§2.5.). Both are gemstones of extreme hardness (Mohs 5.5-6 and Mohs 7, respectively), thus in their cases emery abrasive was necessary for craftsmen. On the other hand, texts §2.1. and §2.6. also contain the word denoting lead, a soft metal (Mohs 1.5), without any apparent reason why emery abrasive would have been necessary in order to work it. While discussing the passage, presented here as §2.6., Loding (1981: 12) drew attention to the fact that lead was an ingredient of glass making according to the glass recipes published by Oppenheim (*et al.* 1970). In addition to this observation, Loding related ú-na<sub>4</sub>-gug to ú babbar, another ingredient of glass making, and so she came to the conclusion that the passage in question may describe the making of glass.<sup>22</sup> Although plausible, this is not the only interpretation that can be put forward. Another understanding of the text can be based on the Old Babylonian evidence, which is analogous to the Ur III texts regarding that it mentions lead in the same context as emery abrasive. In the epic *Lugale* one fate decreed by Ninurta is that the <sup>na4</sup>ú shall be taken by lead or, according to the bilingual recension, it shall be dragged together with lead (§5.2.1.). Similarly, two Mari texts also refer to lead, while discussing how the *šammu* stone, the Akkadian equivalent of <sup>na4</sup>ú,<sup>23</sup> is to be utilized (§5.1.5. and §5.1.13.). These texts are especially suggestive, since they mention, just like the Ur III text §2.1. does, further stone names after referring to lead and *šammu*. These are the alabaster (Mohs 1.5-2) and another stone named *duhšú*, which is probably the word denoting chlorite (Mohs 2-2.5) and steatite (Mohs 1).<sup>24</sup> Some texts of both the Ur III and Old Babylonian periods thus seem to refer to the combination of three materials, which are lead, emery abrasive under the names ú-na<sub>4</sub>-gug, <sup>na4</sup>ú or *šammu*, and a certain type of stone instead of. While it is obvious that the emery abrasive was the tool with which a given stone could be cut, it is less understood what lead had to do in this context. Fortunately, Heimpel already discussed this question and suggested that “the lead was used in lumps or blocks and that the soft metal served to hold the grains of emery in place. ... The combination with lead could thus have been a functional forerunner of emery paper. The

20. Cf. Heimpel *et al.* 1988: 198.

21. Cf. Reiter 1997: 123 n. 49.

22. See also §1.3.

23. The lexical evidence is to be found in the Nippur forerunner ll. 156-157 (MSL 10, p. 59) and in the Late Old Babylonian forerunner ll. 192-196 (MSL 10, p. 53) of UR<sub>5</sub>-ra, as well as in ll. 398-403 of the canonical text (MSL 10, p. 15), which was reconstructed on the basis of the Ras Shamra recension ll. 325-330 (MSL 10, p. 49).

24. See Schuster-Brandis 2008: 407.

high specific weight of lead should also have helped to keep it and with the abrasive grains of emery in close contact with the surface that was being worked” (Heimpel *et al.* 1988: 200). Although there is no explicit proof, which would show the accuracy of Heimpel’s theory other than the already mentioned sources, it should be noted that emery abrasive and lead could work this way according to the finds presented by Gorelick and Gwinnett.<sup>25</sup> The researches forced grains of emery into a sheet of lead and then used this tool on different stones. As it turned out, the emery remained embedded in the lead without noticeable loosening. So it seems that ancient lapidaries could polish soft and hard stones with the help of emery grains inserted into lead, the same way as it is done with emery paper today.<sup>26</sup>

#### 4. Conclusion

4.1. In spite of some minor differences, like the presence of the sculptor (*tibira*) in the Mari text instead of the stonecutter (*zadim*),<sup>27</sup> there seems to be a well-definable analogy between the two expressions, *ú-na<sub>4</sub>-gug* and *na<sup>4</sup>ú* (*šammu*), occurring in the Ur III and in the Old Babylonian sources, respectively. It can be seen that both *ú-na<sub>4</sub>-gug* and *na<sup>4</sup>ú* (*šammu*) played a role in the craft of stonecutting, where they were connected to stones with a hardness that made them impossible to cut, unless the craftsman applied emery abrasive. This experience appears to be depicted by the epic *Lugale*, discussing that with *na<sup>4</sup>ú* one of the hardest stones, carnelian, could be cut. Similarly, the expression *ú-na<sub>4</sub>-gug* reflects this notion by containing the words for emery abrasive and carnelian. The emery abrasive played a role not only in cutting and piercing, but it was also used in polishing the surface of hard and soft stones.<sup>28</sup> In this respect, both the Ur III and Old Babylonian sources show the importance of lead, into the surface of which the grains of emery abrasive were inserted. Thus, the functional forerunner of modern emery paper may have already been known in the stonecutting craft of the Ur III period, and later on the Old Babylonian craftsmen also made use of it.

4.2. Finally, attention should be drawn to the fact that the expression *ú-na<sub>4</sub>-gug* is known so far only from a handful of Ur III texts. One reason for its scarce attestation might be that the preferred raw materials for cylinder seals were different in the Ur III and Old Babylonian periods. While in the Ur III period chlorite was used overwhelmingly and hematite was not as important, at the beginning of the Old Babylonian period hematite became the cylinder seals’ main raw material and chlorite ceased to be of importance.<sup>29</sup> Since chlorite is a relatively soft stone (Mohs 2-2.5), it can be worked without emery abrasive, unlike hematite, which is such a hard stone that it is impossible to cut without the help of emery abrasive and copper or bronze drill head.<sup>30</sup> The change from chlorite to hematite might thus be one factor that could contribute to the increased use of emery abrasive in the Old Babylonian period, also reflected by the written sources of the era. In addition, the possibility that the Ur III lapidaries employed other abrasive materials, too, should also be taken into consideration. The exploration of this possibility, however, lies beyond the scope of this paper. Suffice it to say that besides its importance as raw material

25. See Heimpel *et al.* 1988: 210.

26. Cf. Reiter 1997: 130-131.

27. §5.1.4.; §5.1.5.; §5.1.9.; §5.1.11. Note that the presence of *tibira* in the Mari texts instead of *zadim* known from the Ur III sources accords well with the fact that the term *zadim* does not seem to have been used in the meaning “lapidary” after the Ur III period, but instead it denoted a completely different profession, that of the bow makers’ (*sasinnu*). See Loding 1981: 14.

28. Note that alabaster, the working material most commonly referred to in the Mari texts, is among the softest stones used by Mesopotamian lapidaries (Mohs 1.5-2).

29. See Moorey 1994: 75-76.

30. See Gwinnett, Gorelick 1987.

for cutting tools and inlays, obsidian (zú) known from other Ur III sources<sup>31</sup> could also have been an appropriate abrasive material.

## 5. Appendix

### 5.1. Texts from Mari

#### 5.1.1. Text 1: ARMT 21 No. 221

- |  |                                       |
|--|---------------------------------------|
| 1. 5 gín kug-[babbar]  | 5 shekels silver                      |
| 2. <i>a-na ši-im</i> 1 gú <sup>?</sup> na <sup>4</sup> <i>ša-am-mi</i> | for buying one talent emery abrasive. |
| 3. 5 gín kug-babbar  | 5 shekels silver                      |
| 4. <i>a-na su-lu-hi</i>  | for the <i>sulumhû</i> garment.       |
| 5. 2 <sup>?</sup> gín kug-babbar                                       | 2 shekels silver                      |
| 6. [...] x nim   |                                       |

#### 5.1.2. Text 2: ARMT 21 No. 265 (ZL 3'.04.12)

- |   |                                  |
|---|----------------------------------|
| 1. 2 ma-na 10 gín na <sup>4</sup> <i>ša-am-mu</i>     | 2 mina 10 shekels emery abrasive |
| 2. <i>a-na ši-pí-ir</i>                               | for working on                   |
| 3. gi <sup>is</sup> <i>gu-za ša</i> d <sup>u</sup> tu | the throne of Šamaš              |
| 4. <i>ù alam lugal</i>                                | and the statue of the king,      |
| 5. <i>šu-ti-a</i>                                     | accepted                         |
| 6. <i>ì-lí-uš-ra-an-ni</i>                            | by Ili-ušrani.                   |
| 7. <i>iti a-bi-im</i>                                 | The month of Abum,               |
| 8. u <sub>4</sub> 12-kam                              | day 12,                          |
| 9. <i>mu zi-im-ri-li-im</i>                           | the year when Zimri-lim          |
| 10. <i>alam-šu a-na</i> d <sup>i</sup> škur           | dedicated his statue to Addad    |
| 11. <i>ša ha-la-ab</i> <sup>ki</sup>                  | of Halab.                        |
| 12. <i>ú-še-lu-ú</i>                                  |                                  |

#### 5.1.3. Text 3: ARMT 21 No. 269 (ZL 1'.10.XX)

- |  |                           |
|--|---------------------------|
| 1. 10 gín <i>ša-am-mu</i>                | 10 shekels emery abrasive |
| 2. <i>a-na pa-la-aš mar-ri</i>           | for piercing spades       |
| 3. <i>ma-ah-la-ši</i>                    | (and) scrapers,           |
| 4. [š <sup>u</sup> -ti]-a                | accepted                  |
| 5. [ <i>ia-am-š</i> ] <i>í-ha-at-nu</i>  | by Yamši-Hatnû.           |
| 6. [iti d <sup>ni</sup> ] <i>n-bi-ri</i> | The month of Bēlet-biri,  |
| 7. [u <sub>4</sub> x]-kam                | day x,                    |
| 8. <i>mu zi-im-ri-li-im</i>              | the year when Zimri-lim   |
| 9. <i>a-ah-pu-ra-tim</i>                 | put Ah-Purattim           |
| 10. <i>uš-te-še-ru</i>                   | in order.                 |

#### 5.1.4. Text 4: ARMT 23 No. 67 (ZL 1'.11.05)

- |   |                                    |
|---|------------------------------------|
| 1. 26 ma-na na <sup>4</sup> <i>ša-am-mu sù-tu-ú</i> | 26 mina <i>sutû</i> emery abrasive |
| 2. <i>a-na ši-pí-ir</i>                             | for working on                     |

31. See e.g. CUSAS 3 No. 1372 i 26, iii 21; MVN 1 221 rev. 17; Nisaba 15 No. 533 obv. 15.

3. <sup>na4</sup> giš-nu <sub>11</sub> -gal	alabaster
4. ša gîr-gub.há	footstools
5. ù si.há	and horns,
6. šu-ti-a	accepted
7. <sup>lú</sup> tibira.meš	by the sculptors.
8. iti ki-is-ki-sí-im	The month of Kiskissum,
9. u <sub>4</sub> 5-kam	day 5,
10. mu zi-im-ri-li-im	the year when Zimri-lim
11. a-ah-pu-ra-tim	put Ah-Purattim
12. uš-te-še-ru	in order.

## 5.1.5. Text 5: ARMT 23 No. 68

1. 15 ma-na <sup>na4</sup> ša-a[m-mu]	15 mina emery abrasive,
2. 15 ma-na a-ba-ru-um	15 mina lead,
3. 1 ma-na urudu	1 mina copper
4. a-na 2 qar-na-tim ša <sup>na4</sup> aš-nu-gal-lim	for 2 horns of alabaster.
5. 20 <sup>7</sup> ma-na <sup>na4</sup> ša-am-mu 15 ma-na a-ba-ru-u[m]	20 mina emery abrasive, 15 mina lead,
6. 1 ma-na urudu a-na 2 qar-na-tim ša <sup>na4</sup> aš-nu-gal-lim	1 mina copper for 2 horns of alabaster.
7. 30 ma-na <sup>na4</sup> ša-am-mu 30 ma-na a-ba-ru-um	30 mina emery abrasive, 30 mina lead,
8. 2 ma-na urudu a-na 2 <sup>gis</sup> gîr-gub sag	2 mina copper for 2 first-rate footstools
9. ša <sup>na4</sup> aš-nu-gal-lim	of alabaster.
10. 25 ma-na <sup>na4</sup> ša-am-mu 15 ma-na a-ba-ru-um	25 mina emery abrasive, 15 mina lead,
11. 2 ma-na urudu a-na ša-aš-ša-ra-tim	2 mina copper for saws
12. a-na 4 sí-ka-at <sup>na4</sup> aš-nu-gal-lim	(and) for 4 pegs of alabaster.
13. 15 ma-na <sup>na4</sup> ša-am-mu	15 mina emery abrasive,
14. 15 ma-na a-ba-ru-um	15 mina lead,
15. 1 ma-na urudu a-na 2 sí-ka-at	1 mina copper for 2 pegs
16. <sup>na4</sup> aš-nu-gal-lim ù 2 sí-ka-at	of alabaster and 2 pegs
17. <sup>na4</sup> an-za-li-mi-im	of <i>anzalīmu</i> stone.
18. 10 ma-na <sup>na4</sup> ša-am-mu	10 mina emery abrasive,
19. 10 ma-na a-ba-ru-um	10 mina lead,
20. 1/2 ma-na urudu	1/2 mina copper
21. a-na 1 sí-ka-tim	for 1 peg
22. <sup>na4</sup> aš-nu-gal-lim ù 2 <sup>na4</sup> an-za-li-mi-im	of alabaster and 2 of <i>anzalīmu</i> stone.
23. 10 ma-na <sup>na4</sup> ša-am-mu	10 mina emery abrasive,
24. 10 ma-na a-ba-ru-um	10 mina lead,
25. 1 ma-na uru[du]	1 mina copper
26. a-na 2 <sup>na4</sup> [ ... ]	for 2 ...
27. ù 2 mu-ru-um-š[e-e]	and 2 <i>murumšû</i> weapons
28. ša <sup>na4</sup> aš-nu-ga[l-lim]	of alabaster.
29. šu-nígin 2 gú 8 ma-[na <sup>na4</sup> ša-am-mu]	Altogether 2 talents 8 mina emery abrasive,
30. 1 gú 50 ma-na [a-ba-rum]	1 talent 50 mina lead,
31. 8 1/2 ma-na [urudu]	8 1/2 mina copper.
32. e-ri-iš-ti dumu.meš <sup>lú</sup> tibira	The need of the sculptor apprentices
33. ša mu 1-kam	in the first year.
34. 24 2/3 ma-na kug-babbar	24 2/3 mina silver (worth).

## 5.1.6. Text 6: ARMT 23 No. 380 (ZL 3'.05.27)

- |  |                               |
|--|-------------------------------|
| 1. 1 1/2 ma-na <sup>na4</sup> ša-am-mu | 1 1/2 mina emery abrasive     |
| 2. a-na ši-pí-ir                       | for working on                |
| 3. giš-nu <sub>11</sub> -gal           | alabaster,                    |
| 4. šu-ti-a                             | accepted                      |
| 5. ia-šu-ub-na-ar                      | by Yašub-nâr.                 |
| 6. iti hi-bir <sub>5</sub> -tim        | The month of Hibirtum,        |
| 7. u <sub>4</sub> 27-kam               | day 27,                       |
| 8. mu zi-im-ri-li-im                   | the year when Zimri-lim       |
| 9. alam-šu a-na <sup>d</sup> iškur     | dedicated his statue to Addad |
| 10. ša ha-la-ab <sup>ki</sup>          | of Halab.                     |
| 11. ú-še-lu-ú                          |                               |

## 5.1.7. Text 7: ARMT 23 No. 525 (ZL 1'.10.28)

- |                               |   |
|-------------------------------|---|
| 1. 1 ma-na 4 gín ú pa-li-šú   | 1 mina 4 shekels of “piercing emery abrasive” |
| 2. a-na sà-pa-an              | for polishing                                 |
| 3. 1 <sup>na4</sup> sú-i-im   | 1 <i>sú</i> stone,                            |
| 4. šu-ti-a ia-šu-ub-a-šar     | accepted by Yašûb-ašar.                       |
| 5. iti <sup>d</sup> nin-bi-ri | The month of Bēlet-biri,                      |
| 6. u <sub>4</sub> 28-kam      | day 28,                                       |
| 7. mu zi-im-ri-li-im          | the year when Zimri-lim                       |
| 8. a-ah-pu-ra-tim             | put Ah-Purattim                               |
| 9. uš-te-še-ru                | in order.                                     |

## 5.1.8. Text 8: ARMT 23 No. 526 (ZL 1'.10.30)

- |   |                          |
|---|--------------------------|
| 1. 1/3 ma-na <sup>na4</sup> ša-am-mu                      | 1/3 mina emery abrasive  |
| 2. a-na ta-ra-am <sup>na4</sup> giš-nu <sub>11</sub> -gal | for cutting alabaster,   |
| 3. šu-ti-a  | accepted                 |
| 4. ia-šu-ub-na-ar   | by Yašûb-Nâr.            |
| 5. iti <sup>d</sup> nin-bi-ri                             | The month of Bēlet-biri, |
| 6. u <sub>4</sub> 30-kam                                  | day 30,                  |
| 7. mu zi-im-ri-li-im                                      | the year when Zimri-lim  |
| 8. a-ah-pu-ra-tim   | put Ah-Purattim          |
| 9. uš-te-še-ru  | in order.                |

## 5.1.9. Text 9: ARMT 23 No. 527 (ZL 2'.07.22)

- |   |                                    |
|---|------------------------------------|
| 1. 2 ma-na <sup>na4</sup> ša-am-mu          | 2 mina emery abrasive,             |
| 2. šu-ti-a                                  | accepted                           |
| 3. šil-li-ku-bi tibira                      | by Šilli-kubi, the sculptor.       |
| 4. 2 ma-na <sup>d</sup> nanna-ša-la-sú      | 2 mina (accepted by) Nanna-šalasu. |
| 5. 2 ma-na i-bi- <sup>d</sup> iškur         | 2 mina (accepted by) Ibi-Iškur.    |
| 6. šu-nigin 6 ma-na <sup>na4</sup> ša-am-mu | Altogether 6 mina emery abrasive   |
| 7. zi-ga                                    | were accounted for.                |
| 8. iti ki-nu-nim u <sub>4</sub> 22-kam      | The month of Kinūnum, day 22,      |
| 9. mu zi-im-ri-li-im                        | the year when Zimri-lim            |
| 10. da-am <sub>7</sub> -da-am               | was victorious                     |

11. *ša dumu.meš ia-mi-n[a]* over the Benyaminites  
 12. *ù lugal.meš-šu-nu* and killed their kings.  
 13. *i-du-ku*

## 5.1.10. Text 10: ARMT 23 No. 528 (ZL 4'.04.21)

1. 1 ma-na<sup>na4</sup> *ša-am-mu* 1 mina emery abrasive  
 2. *a-na ta<sup>2</sup>-ra-am* for cutting  
 3. 1<sup>na4</sup> *sú-i-im* 1 *sú* stone,  
 4. *šu-ti-a* accepted  
 5. *ia-am-ši-ha-at-nu* by Yamsi-Hatnû.  
 6. *iti a-bi-im u<sub>4</sub> 21-kam* The month of Abum, day 21,  
 7. *mu zi-im-ri-li-im* the year when Zimri-lim  
 8. <sup>gis</sup>*gu-za gal* dedicated a great throne  
 9. *a-na<sup>d</sup>utu ú-še-lu-ú* to Šamaš.

## 5.1.11. Text 11: ARMT 23 No. 529 (ZL 4'.04.25)

1. 1 ma-na<sup>na4</sup> *ša-am-mu* 1 mina emery abrasive  
 2. *a-na ša-ra-am* for cutting  
 3. *sú-i-im* *sú* stone,  
 4. *šu-ti-a ia-am-ši-ha-at-nu* accepted by Yamsi-Hatnû,  
 5. *tibira* the sculptor.  
 6. *iti a-bi-im u<sub>4</sub> 25-kam* The month of Abum, day 25,  
 7. *mu zi-im-ri-li-im* the year when Zimri-lim  
 8. <sup>gis</sup>*gu-za gal* dedicated a great throne  
 9. *a-na<sup>d</sup>utu ú-še-lu-ú* to Šamaš.

## 5.1.12. Text 12: ARMT 23 No. 530 (ZL 4'.05.05)

1. 1/3 ma-na<sup>na4</sup> *ša-am-mu* 1/3 mina emery abrasive  
 2. *a-na ša-ra-am* for cutting  
 3. <sup>na4</sup>*sú-i-im* *sú* stone,  
 4. *šu-ti-a* accepted  
 5. *ia-am-ši-ha-at-nu-ú* by Yamsi-Hatnû.  
 6. *iti hi-bir<sub>5</sub>-tim* The month of Hibirtum,  
 7. *u<sub>4</sub> 5-kam* day 5,  
 8. *mu zi-im-ri-li-im* the year when Zimri-lim  
 9. <sup>gis</sup>*gu-za gal a-na* dedicated a great throne  
 10. <sup>d</sup>UTU *ú-še-lu-ú* to Šamaš.

## 5.1.13. Text 13: ARMT 23 No. 531 (ZL XX.08.14)

1. 5 1/3 ma-na *a-ba-ru* 5 1/3 mina lead  
 2. 3 ma-na *ša-am-mu* 3 mina emery abrasive  
 3. *a-na ši-pí-ir du-uh-ši-i* for working on *duhšú* stone  
 4. *ù qa-ar-na-at* and the horns  
 5. <sup>gis</sup>*gigir na4 aš-n[u-gal-lim]* of the alabaster chariot,

6. šu-ti-a a-ri <sup>2</sup> -ip <sup>2</sup> -[ ... ] <sup>32</sup>	accepted by ...
7. iti da-gan	The month of Dagan,
8. u <sub>4</sub> 14-kam	day 14.

## 5.1.14. Simonet 1977: 163 No. 140

1/2 ma-na ša-am-mu	1/2 mina emery abrasive
a-na ši-pi-ir giš-nu <sub>11</sub> -gal	for working on alabaster

## 5.1.15. ARMT 26/1 134

1'. [ ... ]	...
2'. a-nu-um x-[ ... ]	...
3'. it-ti b[e-lí-ia il-l]i-ku	they went with my lord
4'. aṭ-tà-[ar-da-ku]m	I sent (them) to you;
5'. lú.meš šu-n[u a-na ... š]u-nu	(and) those people, to their ...
6'. la i-tu-r[u]-nim	they must not return!
7'. in-nu-ha-[r]a-[a]m	With alum,
8'. qí-it-ma-[am]	black paste
9'. ù ša-am-ma-am pa-li-[š]a-a[m]	and drilling emery abrasive
10'. i-na pa-né-šu-nu	they
11'. li-iš-šu-nim	must be provided!
12'. ša-ni-tam ši-pi-i[r] alam]	On the other hand, the work on the statue
13'. ša <sup>d</sup> nin-bi-ri i-na e-pé-ši-[š]u	of Bēlet-biri, in (terms of) its making,
14'. ga-me-er	is finished.

5.2. *The epic Lugale*5.2.1. *Lugale 425*

usu tuku a-gar <sub>5</sub> -re šu hé-gíd-dè	O, possessor of power! May the lead take you!
usu tuku a-gar <sub>5</sub> -ra šu hu-mu-un-gíd-i	May the possessor of power take you <sup>1</sup> with lead!
ra-áš e-mu-qí i+na a-ba-ri liš-ta-da-ad-ku	May the possessor of power drag you with lead!

5.2.2. *Lugale 432*

en-me-en <sup>na4</sup> gug me-ri gúl-la za mu-bi hé-še <sub>21</sub>
en-me-en <sup>na4</sup> gug bûru-da mu-bi hé-še <sub>21</sub> - <sup>r</sup> a <sup>r</sup>
be-lé-ku sa-an-ta i+na pa-la-ši šu-ma šu-a-tu lu-ú na-b[a-a]t

I am the Lord: “The one who crushes the whole carnelian” – May you be called by this name!

I am the Lord: “The one who pierces the carnelian” – May you be called by this name!

I am the Lord: “Carnelian in piercing” – May you be called by this name!

5.2.3. *Lugale 434*

ud-da <sup>na4</sup> ú ub-tag <sup>na4</sup> gug bûru-da ur <sub>5</sub> hé-en-na-nam-ma
ud-da kalam-ma na <sub>4</sub> -a ub-tag <sup>na4</sup> gug bûru-da ur <sub>5</sub> hé-na-[nam-me]

32. Another possible reading of the signs is a-dal-l[u ...]. This reading can be connected to Adal-, often attested in Mari personal names; see Reiter 1997: 130 n. 68.

u<sub>4</sub>-ma i+na kur ab-nu il-la-pat<sup>1</sup> sa-an-tu ip-pa-la-áš ši-i lu-[ú ka-am]  
 (From) today (on): After the “abrasive” has touched it, the carnelian is pierced. Let it be so!  
 (From) today (on): After it has touched it with stone in the Land, the carnelian is pierced. Let it be so!  
 When a stone is touched in the Land (or) the carnelian is pierced, let it be so!

## 6. Abbreviations

AHw	W. von Soden, <i>Akkadisches Handwörterbuch</i> , Wiesbaden, 1959-1981.
ARMT 21	J.-M. Durand, <i>Textes administratifs des salles 134 et 160 du palais de Mari, transcrits, traduits et commentés</i> (= Archives Royales de Mari 21), Paris, 1983.
ARMT 23	G. Bardet et al., <i>Archives administratives de Mari 1</i> (= Archives Royales de Mari 23), Paris, 1984.
ARMT 25	H. Limet, <i>Textes administratifs relatifs aux métaux</i> (= Archives Royales de Mari 25), Paris, 1986.
ARMT 26/1	J.-M. Durand, <i>Archives épistolaires de Mari I/1</i> (= Archives Royales de Mari 26/1), Paris, 1988.
BDTNS	Base de Datos de Textos Neosumerios ( <a href="http://bdtms.filol.csic.es">http://bdtms.filol.csic.es</a> ).
CAD	A. L. Oppenheim et al. (eds.), <i>The Assyrian Dictionary of the University of Chicago</i> , Chicago, 1956-2010.
CDLI	Cuneiform Digital Library Initiative ( <a href="http://cdli.ucla.edu">http://cdli.ucla.edu</a> ).
CUSAS 3	D. I. Owen, R. H. Mayr, <i>The Garshana Archives</i> (= Cornell University Studies in Assyriology and Sumerology 3), Bethesda, 2007.
MSL 10	B. Landsberger, <i>The Series Har-ra = hubullu, Tablets XVI, XVII, XIX and Related Texts</i> (= Materials for the Sumerian Lexicon 10), Roma, 1970.
MVN 1	P. Mander, <i>Administrative Texts of the Archive L.2769</i> (= Materiali per il Vocabolario Sumerico 1), Roma, 1990.
Nisaba 15	D. I. Owen, <i>Cuneiform Texts Primarily from Iri-Saġrig / Āl-Šarrākī and the History of the Ur III Period</i> (= Nisaba 15), Bethesda, 2013.
PSD	Å. W. Sjöberg et al. (eds.), <i>The Sumerian Dictionary of the University Museum of the University of Pennsylvania</i> , Philadelphia, 1984-1994.
TCL 5	H. de Genouillac, <i>Textes économiques d'Oumma de l'époque d'Our</i> (= Textes Cunéiformes du Louvre 5), Paris, 1922.
TIM 7	D. O. Edzard, <i>Altbabylonische Rechts- und Wirtschaftsurlunden aus Tell ed-Der bei Sippar</i> (= Texts in the Iraq Museum 7), Wiesbaden, 1971.
UET III	L. Legrain, <i>Business Documents of the Third Dynasty of Ur</i> (= Ur Excavations Texts III), London, 1937.

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