

Accounts of Ben Yiju's Indian Workshop for Bronze Vessels


Between 1132 and 1149

University Library Cambridge Or 1080 J 95

34,5 x 7,5 cm

This long and narrow strip is very unevenly cut, and the ends of ll. 1-8 have been torn away irregularly. The paper is woolly and dark-brown and in a bad state of preservation: corrugated, stained, and covered in various places with a dark substance, which cannot be removed without destroying the writing beneath it. The sheet was folded into extremely narrow strips, between 1/2 and 1 cm wide, as people do still in Yemen with their accounts and other documents. On the backside, the accounts Nos. 66 and 67 are written, which were certainly done not in India, but in Aden. Whether No 65 preceded Nos. 66-7 in time cannot be made out for the moment.

Our text is of considerable interest for the history of the copper industry. The following facts, which partly are confirmed by other documents, emerge from it:

- 1) The workmen did not receive wages, but were remunerated for piece-work.
 ~~As we have seen in No. (64), l. 5,~~ ^{Ben Yiju} ~~the boss~~ himself was assisted by slaves and a local Jew, whose ~~labor~~ ^{is} status ~~was~~ not specified, see .
- 2) The craftsmen were paid according to the weight of the vessels produced, ^{which was also} see here ll. 4 and 26 - a system still in use, ~~evg.~~ with the Jewish silversmiths in Yemen.
- 3) The weight of the finished product did not differ much from that of the metals put into it. In ll. 19-27, we find that out of 116 1/2 fill of bronze and 2 fill of tin, the master cast a "table-jug" of 45 f. and an ingot of 70f., altogether 115 f.
- 4) The coppersmith certainly used the same procedure of "cire perdue," which

is applied in India in the traditional copper industry today, see Census of India, Vol. 28, 448, quoted above, p. . For the Arabic word ^oasal, "honey," in l. 10, certainly denotes "wax," as it is mentioned together with "rice husks for fuel" in l. 11. The Sanskrit word for wax, makshikaja or makshikamala is derived from makshika "honey." Thus, the use of the Ar. word honey for wax may be simply the translation of a local term. (Cf. also Dozy, Supplément II, 128b: ^h sam^o ^oasalī "chandelle de cire" - modern usage - where ^oasal also stands for "wax").

5) As the small quantity of tin indicates (less than 1/50), see ll. 19-27, it was not copper which was melted here, but bronze which was recast. Although the Adenese merchants, writing to Ben Yijū, use the words ṣufr ("yellow," copper) and naḥās (copper) indiscriminately, see above No. 51, l. 11, ṣufr must design here bronze or even brass.

6) Borax was used in the brass industry, as it is today, see l. 25.

7) It is also interesting to note that one man working for B.Y. is called ^oIyārī. ^oIyār means marking or assaying measures and weights. Thus, the artisan obviously had been - or perhaps still was - an officer of a mint or of the market police. Another man is called Ibn al-^oIyārī, see ll. 16 and 19, which shows that such a connection was quite natural.

The account is subdivided into two parts by a line drawn beneath l. 18.

T r a n s l a t i o n

(1) Owned by the melters //.....// al-^oIyā((rī)) (2) and his son LNBY 4 M((alīkī)) dīnārs (3) and a half.

Due to them, the balance of the account, namely (4) //4 fill more than in the account// payment for the fabrication of one farāsila and eighty (5) fill. The

price of one farāsila: 5 raubaj. (6) Total: 9 raubaj, which is ^{the} an equivalent of
 (7) 31 dirham and one fāj. Balance: (8) 5 dirhams less one fāj and half a d((irham)).
 (9) Altogether 5 dirhams (10) and a fāj.

He ^eowns one fāj for wax (11) and one for rice husks for fuel (12) and one dirham cash.

(13) Al-^oIyārī and his son LNBY received (14) one bar (of bronze) and 3 fill less //one quarter// (15) of Qal^oī (tin). LNBY received also 10 fill, (16) which he handed over to Ibn al-^oIyārī (17) and another 20 fill. Altogether one farāsila (18) and 23 fill.

(19) Ibn al-^oIyārī received also (20) one farāsila and six fill and a half (21) bronze in a bar, as well as two fill (22) Qal^oī (tin). Altogether one farāsila and 8 fill (23) and a half, and also 10 fill, which were handed over to him (24) by LNBY al-^oIyārī. (25) He owes also two dirhams and for one dirham borax.

(26) He manufactured a "table-jug" of 45 fill (27) and an ingot of 70 fill.

C o m m e n t a r y

1 the melters - the fourth and fifth letters of the word are doubtful. Before al-^oIyārī, several letters were inserted above the line, which, for the time being, defy explanation, perhaps al-^oIyārī's first name.

2 For M((alīkī)), one could read, of course, also M((iṣrī)), i.e. Egyptian. However, in these papers, always Malikī dīnārs and Egyptian mitqāls are mentioned as being in use in India.

4-6 These lines prove that one farāsila contained 100 fill.

6 One raubaj was evidently equal to about 3 1/2 (Indian) dirham.

10 wax - see the Introduction to this document.

11 For rice husks as fuel, see No. 64 B, l. 4.

14 one bar - Namely of bronze, see ll. 19-23.

15 Qal^cī (tin) - See No. 51, l. 26.

17-8. The addition is correct: Out of a total of 33 fill, LNBY had delivered to Ibn al-^cIyārī 10 f. These 10 fill are referred to in ll. 23-4.

25 borax - Ar. tinkā((r)), spelled in No. 85 margin, l. 7-8 dinkār. This sodium borate is "invaluable in welding and employed by blacksmiths and brassfounders," see Sir George Watt, *The Commercial Products of India*, p. 172-3, and Meyerhof-Maimonide, *Matière Médicale*, No. 383.

26 "table-jug" - See above No. 51, l. 12.

27 ingot - Ar. masbūk, cf. naḥās sabīka, mentioned in ms. Heb. Bodleian, Oxford a 3 (Cat. 2873), fol. 26 verso, l. 11.