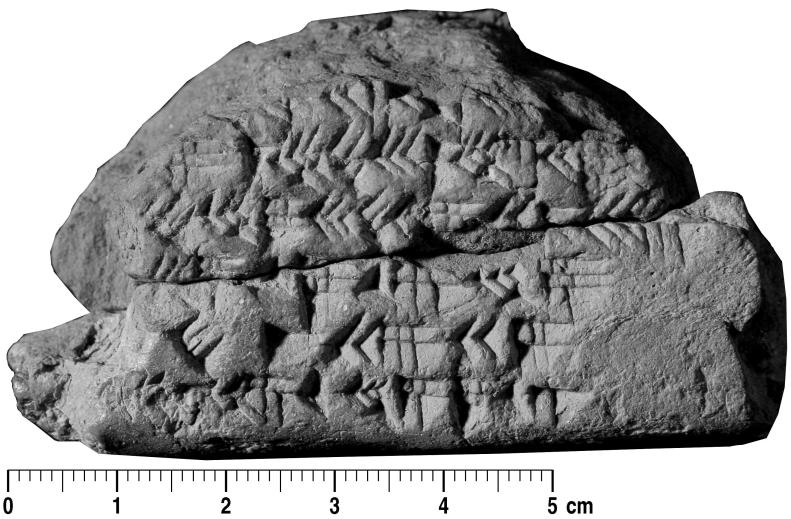
58) A new join to the Late Babylonian factorisation table BM 34958[+*)] — The small fragment BM 42792 (81-7-1, 556) from the Babylon collection of the British Museum joins BM 34958 (+) 42744+45977+46008, a Late Babylonian factorisation table (Ossendrijver 2014, Text B). In a factorisation table a sexagesimal number is successively divided by its constitutive factors, until 1 is reached. BM 42744+45977+46008 (obv. 1'-14') partly preserve 14 numbers corresponding to $9^{11}\times12^{39}$ until $9^{11}\times12^{26}$ (the former is a 30-digit number). BM 42792 joins BM 34958; together they partly preserve the numbers corresponding to $9^{11}\times12^{24}$ until $9^{11}\times12^{19}$ (obv. 16'-21'). They do not physically join the other fragments, but only a small amount of clay corresponding to one line of text (obv. 15') remains missing between them.



Photograph of BM 34958+42792 (obverse).

Transliteration and reconstruction of BM 34958+42792 (obverse)
Obverse

16' [6.49.23.46.7.53.17.51.21.43.38.28.7.36.23].⸢54.22.41⸣.[39.50.24] (= $9^{11}\times12^{24}$)
17' [34.6.58.50.39.26.29.16.48.38.12.20.3]8.1.59.31.53.28.⸢1⸣[9.12] (= $9^{11}\times12^{23}$)
18' [2.50.34.54.13.17.12.26.24.3.11.1.43.10.0]9.57.39.2⸢7.21.36⸣
(= $9^{11}\times12^{22}$)
19' [14.12.54.31.6.26.2.12.0.15.55.8.35.50.49].48.17.16.48 (= $9^{11}\times12^{21}$)
20' [1.11.4.32.35.32.10.11.0.1.19.35.42.59.1]⸢4⸣.9.1.26.24 (= $9^{11}\times12^{20}$)
21' [5.55.22.42.57.40.50.55.0.6.37.58].⸢34⸣.56.10.45.7.12 (= $9^{11}\times12^{19}$)

21': Only traces of the digit 34 are visible. They are also compatible with 58 (thus read in Friberg & Al-Rawi 2016, 78-81).

All numbers in a factorisation table are regular, i.e. they can be written as products of powers of 2, 3 and 5. This strongly constrains the possible reconstructions of the missing digits of a number. Among all regular sexagesimal numbers with up to 30 digits – there are exactly 25059 such numbers – the sequence 8.1.59.31.28 (obv. 17') occurs only in the number shown above. The same is true for the sequence 9.57.39.27 in obv. 18'. The new join therefore confirms the reconstruction presented in Ossendrijver (2014), Text B.

However, it must be pointed out that BM 34958 alone does not allow a unique restoration of its missing digits. Indeed, an alternative reconstruction of BM 34958 was recently proposed by Friberg & Al-Rawi (2016: 78-81, 86). While a sequence of three or four initial or internal digits is usually sufficient for a unique match among all regular numbers with up to 30 digits, the number of digits required for a unique match increases to about six if the preserved digits belong to the end of a number, a complication that was overlooked in Ossendrijver (2014). The ending 48.17.16.48 (obv. 19') occurs in sixteen regular numbers with up to 30 digits, the ending 4.9.1.26.24 (obv. 20') in four such numbers and, if the ambiguous 34 is ignored, then the remaining ending 56.10.45.7.12 (obv. 21') occurs in three such numbers. This results in three possible reconstructions of the numbers in obv. 19'-21' with the property that they correspond to decreasing powers of small regular numbers, as expected for a factorisation table. Apart from the reconstruction presented above, the one proposed by Friberg & Al-Rawi (2016:78-81) is equally possible:

19' [1.11.10.4.46.43.41.7.43.9.26.49].48.17.16.48 (= $2^{53}\times12^{10}$)
20' [5.55.50.23.53.38.25.38.35.47.1]4.9.1.26.24 (= $2^{53}\times12^{9}$)
21' [29.39.11.59.28.12.8.12.58].56.10.45.7.12 (= $2^{53}\times12^{8}$)

Finally, the following reconstruction is also compatible with the preserved digits:

19' [3.28.25.53.5.39.7.29.51.52.42.7.10.32.48.35.40.20.57.16.53.53.43.2.49].48.17.16.48
20' [17.22.9.25.28.15.37.29.19.23.30.35.52.44.2.58.21.44.46.24.29.28.35.1]4.9.1.26.24
21' [1.26.50.47.7.21.18.7.26.36.57.32.59.23.40.14.51.48.43.52.2.27.22].56.10.45.7.12

In this reconstruction the numbers correspond to $2^{117}\times12^{14}$ (19'), $2^{117}\times12^{13}$ (20'), and $2^{117}\times12^{12}$ (21'), respectively. It is only due to the new join that these alternative reconstructions of BM 34958 are now definitely ruled out.

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Mathieu OSSENDRIJVER <mathieu.ossendrijver@hu-berlin.de>
Institut für Philosophie/Excellence Cluster TOPOI, Humboldt-Universität zu Berlin