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A "New" Proto-Cuneiform Tablet

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§1. A previously unpublished archaic tablet has recently become available for study (see figure 1, below). The script style dates this text to the archeological layer Uruk III, indicating that it was written during the Jemdet Nasr Period – about 3100-3000 B.C. The original source of the tablet is unknown, since it was purchased in the antiquities market from a mid-twentieth century private collection in England. Excavations from Uruk and Jemdet Nasr in the early twentieth century yielded many of the tablets now published. Recent illicit excavations in post-war Iraq have brought many tablets to the antiquities market, but not necessarily scholarly study. Given the relative scarcity of texts from this time (less than 6,000 known tablets and fragments, of which about half have been published), the example offered in this work should add significantly to our knowledge and understanding of the world's oldest attested form of writing.

§2. The tablet measures 82×56×18 mm and was assembled from a number of fragments, with small portions having been lost. There is considerable effacement of the surface, particularly on the reverse side. The readability of the tablet was greatly improved after being baked and cleaned at the Yale Babylonian Collection. A proposed translation of each case follows the transliteration in Table 1.

§3. Several grain products are mentioned in this text (see Damerow and Englund 1987: 117-166; Englund 2001: 1-35; Englund 1998: 181-204). Most commonly identified is barley, indicated by the sign ŠE and the use of the numerical ŠE system Š. A different grain product, probably emmer, is indicated by the use of the numerical ŠE system Š". If the reading of $MUNU_4$ is correct, this would represent malt. One or two other signs, including $LAGAB_a$+$ŠITA_{a1}$ and possibly GUG_{2a}, indicate other, as yet unidentified, grain products. In some cases, for example O0102c, notations of barley and emmer are mixed.

§4. At least two numerical sign systems are used in this tablet. One is the Bisexagesimal System B (used for grain products and other objects included in a rationing system; Damerow and Englund 1987: 132-135), and the other is the ŠE System (discussed below). Because of breaks in the tablet, a number of cases, for example O0101d2, are ambiguous regarding the numerical sign system used.

§5. We know that O0101a uses the Bisexagesimal System B, since the quantity $8N_1$ could only be valid in a system where N_1 is worth $^1/_{10}$ of N_{14} (or $^1/_{18}$ of N_{14} in cases of area measures). We can also confidently presume that the cases O0102a, O0103a and O0104a use the Bisexagesimal System B, since the pattern of this tablet suggests that each line begins with a grain product.

§6. The other numerical sign system is designated the ŠE system, used to measure grain, presumably by volume. There is a good deal of evidence that the basis of these measurements is the beveled-rim bowl, a ubiquitous archaic container of standard volume (approximately 0.8 liters; Damerow and Englund 1987: 153-154 n. 60) that may correlate to the quantity N_{30a}. This would mean that the quantity N_{39a} would represent about 4.8 liters.

§7. In this system, a number of fractions of N_{39a} are used, at least five of which are attested on this tablet: $^1/_2$, $^1/_3$, $^1/_4$, $^1/_5$, and one or more smaller fractions. In this case N_{14} is equal to $6N_1$ or $30N_{39a}$. I propose that the unusual correlations between N_{39a}, N_1 and N_{14} suggest that each represented a single unit of some proportional value. An obvious analogy to this would

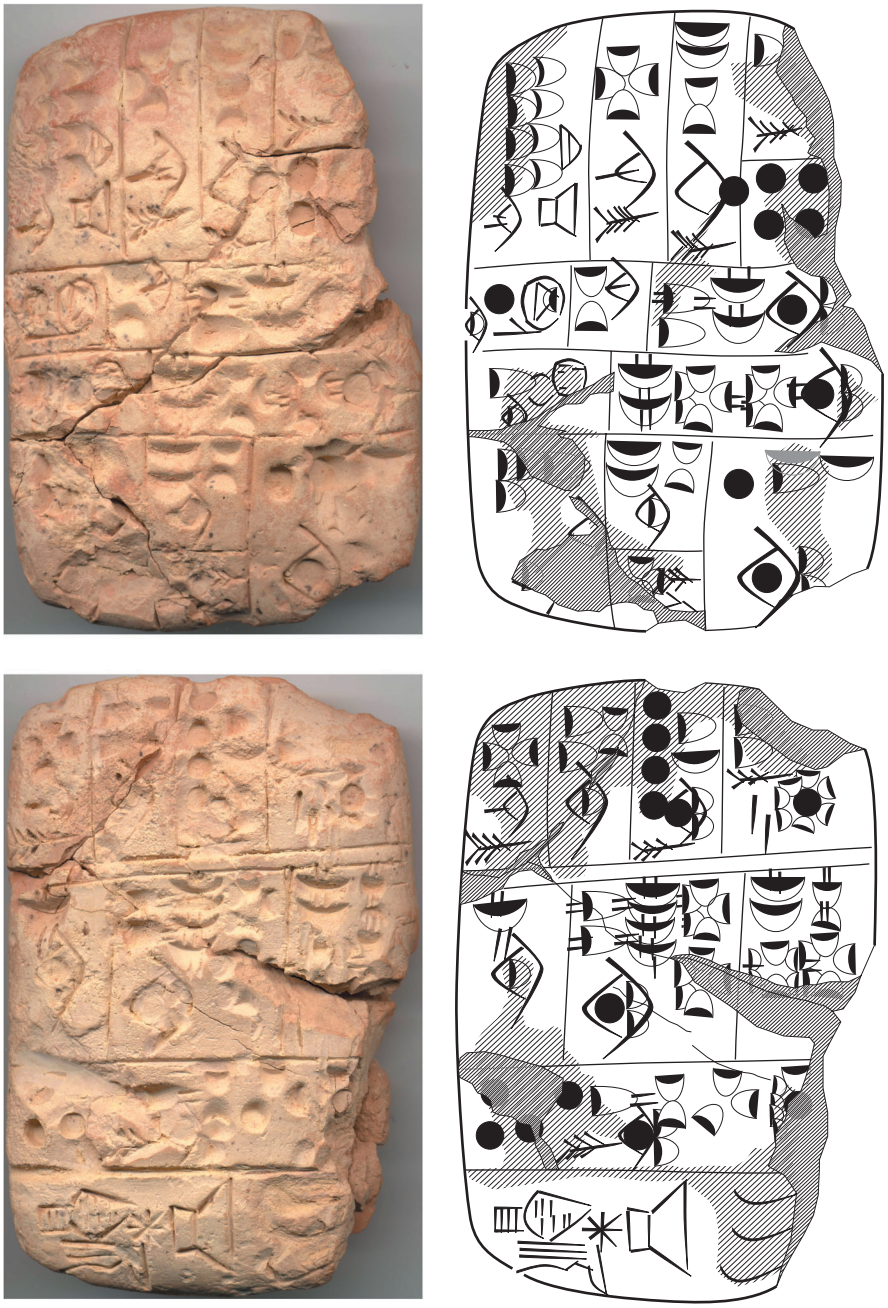

Figure 1: Obverse and reverse surfaces of the text *CDLB* 2003/4 (vector graphic courtesy of R. K. Englund).

be the system of English measurements (e.g., 16 cups = 8 pints = 4 quarts = 1 gallon, and 36 inches = 3 feet = 1 yard). In each case, smaller quantities are easily created out of fractions of the smallest units (e.g. cups, inches and ounces). Because N_{39a} appears to be the smallest of these whole units of volume, I have indicated values of numbers above in N_{39a} (or N_{41a} in the case of emmer).

§8. Two numerical signs deserve special attention. In the first case, R0101d contains a fraction that resembles both N_{30c} and N_{31}, but clearly having 7 crescents around the center rather than 6 or 8. While this may represent a scribal error, the scribe appears fairly experienced and probably intended this configuration. Thus, we will give this sign the new designation N_{30e} (the similar N_{30d} was recently described by Englund 2001:31, with 7 crescents around a central crescent). In the second, the final sign of R0103 appears to represent a fraction of the same numerical sign system. In this case the visible portion suggests a central circular impression with at least, but very possibly more than seven surrounding crescents. The sign might be a repetition of N_{30e} in the total of previous quantities that this line likely represents. The transliteration $N_{31}^{?}$ is therefore to be understood as entirely provisional.

§9. In R0101d, the sign TAR suggests that the associated quantity (which was lost to a break in the tablet) is a fraction of some other number. This may represent a tithe or tax of some sort, and TAR is often taken to mean $^1/_{10}$ of some number (Englund 1987:150). If the number being used in this case is based on the preceding case (i.e., $4N_{14}$ $1N_1$ $1N_{39a}$), then it would be correctly rendered as $2N_1$ $2N_{39a}$ $1N_{24}$ $1N_{30c}$.

§10. One calculation the scribe may have performed would involve the use of estimation. The value in R0102c is remarkably close to $^1/_5$ the value in R0102b. While no presently known fraction of N_{41a} is small enough to allow for a perfect division of the value in R0102b by five, the value given in R0102c would be an estimate accurate to within 0.4%. Thus:

$^1/_5$(R0102b) = $^1/_5(2N_4\ 4N_{41a}\ 2N_{29''})$ = 2.88 (N_{41a})

R0102c = $2N_{41a}\ 1N_{24''}^{?}\ 1N_{29''}^{?}\ 1N_{30a''}$ = 2.87 (N_{41a})

Case	Transliteration	Quantity in N_{39a} or N_{41a}	Sign(s)	Time notations
O0101a	⌜8N_1⌝ ; GAR U_4+2N_{57} AB_a		8 grain rations, temple	2 years
O0101b	1N_{28} ; U_4+1N_{57} $ŠE_a$	1/4	barley	1 year
O0101c	2N_{39a} 1N_{24} ; U_4+1N_{14} $ŠE_a$	2 1/2	barley	10 days
O0101d1	⌜1N_1⌝ [ ] ; [ ] $ŠE_a$	5?	barley	
O0101d2	⌜4N_{14}⌝ ; X [ ]	120?		
O0102a	1N_{14} ; U_4×1N_1 $LAGAB_a$+$ŠITA_{a1}$ ⌜PAP_a?⌝		10 units of grain product 1	1 month
O0102b	1N_{24} ; U_4+1N_{57}	1/2	grain	1 year
O0102c	1N_4 1N_1 1N_{41a} 1N_{39a} ; ⌜U_4×1N_{14}.2N_1⌝ [ ]	6+6	emmer+barley	12 months
O0103a	1N_1 ; X U_4×1N_1? ⌜GUG_{2a}?⌝		1 unit of grain product 2	1 month ?
O0103b	2N_{41a} 2$N_{29"}$; U_4×1N_{14}.2N_1	2 2/5	emmer	12 months
O0104a	⌜5N_1?⌝ ; U_4×1N_1?⌝ X		5 units (?) of grain product 3	1 month ?
O0104b1	2N_{39a} 1N_{24} ; U_4×1N_1	2 1/2	grain	1 month
O0104b2	⌜1N_{28}?⌝ ; $ŠE_a$ $MUNU_4$?⌝ [ ]	1/4?	barley, malt?	
O0104c	1N_{14} 1N_1 1N_{39a} ; U_4×1N_{14}.2N_1	36	barley?	12 months
R0101a	X? ⌜1N_{28} ; U_4+1N_{57}⌝ $ŠE_a$	1/4	barley	1 year
R0101b	⌜2N_1 1N_{24} ; U_4×1N_1⌝	10 1/2	barley?	1 month
R0101c	⌜4N_{14}⌝ 1N_1 1N_{39a} ; ⌜U_4×1N_{14}.2N_1 $ŠE_a$⌝	126	barley	12 months
R0101d	[ ] ⌜2N_1?⌝ [ ] ; ⌜$ŠE_a$⌝ TAR_a 1N_{30e}	?	barley, one-tenth	
R0102a	1N_{41a} ; U_4×1N_1	1	emmer	1 month
R0102b	⌜2N_4 4N_{41a} 2$N_{29"}$⌝ ; U_4×1N_{14}.2N_1	14 2/5	emmer	12 months
R0102c	2N_{41a} 1$N_{24"}$ ⌜1$N_{29"}$ 1$N_{30a"}$⌝ [ ] ; [ ]	2 13/15?	emmer	
R0103	⌜5N_{14}⌝ 1N_4 1N_{24} 1N_{26} ⌜1N_{31}?⌝ ; $ŠE_a$ U_4×1N_{14}.2N_1⌝	5?+150 11/12?	emmer+barley	12 months
R0104	$KAŠ_b$ DA_a AN AB_a ⌜GI+GI? BAR?⌝		dairy fat vessel, hand, star/god, temple, ?	

Table 1: Transliteration of the tablet *CDLB* 2003/4.

This division by five might represent a calculation of the cost of producing some grain product, perhaps by milling, as may generally be the case with the commonly added tenths in proto-cuneiform texts (see §9 above).

§11. The use of a horizontal double line on the reverse suggests that lines R0102 and R0103 include summations of preceding cases. Because of damage to the tablet, in only one case is there a possible summation of previous cases, but only if the differences between Š and Š" are ignored:

R0102b =	O0102c + O0103b:
2N_4 4N_{41a} 2$N_{29"}$ =	1N_4 1N_1 1N_{41a} 1N_{39a}
	+ 2N_{41a} 2$N_{29"}$

§12. The signs in R0104 are likely to be the either the title of an authorized person, the personal signature of that individual, or the name of an institution that the scribe represents. The sign combination "$KAŠ_b$ DA_a AN AB_a" is previously unattested in archaic texts.

§13. Along with this unique colophon, certain other features of this tablet make it unusual among the corpus of tablets that have been studied. The scribe has chosen to produce a single column text, a practice common for tablets dealing with field measurements and animal husbandry, but not for grain accounts. One reason for this may be the use of up to four cases in each line, which would be hard to accommodate on a small tablet with more than one column.

§14. Another unusual feature of this tablet is the extensive use of time notations, which is sufficiently complex as to make interpretation difficult. Three categories of time notation are present on this tablet, namely the designations for days, months and years.

§15. Despite damage preventing a more confident interpretation, each of the lines from O0101 to O0104 seem to start with calculations of a grain product over

time. The end of each line (with the possible exception of O0101, which is badly damaged) concludes with a final sum representing a period of 12 months. Of note, the well-preserved cases O0102c, O0103b and O0104c have quantities that are easily divided by 12. Thus:

O0102c: $1N_4\ 1N_{41a}$ / 12(months)
= $1N_{24}$ per month
$1N_1\ 1N_{39a}$ / 12(months)
= $1N_{24"}$ per month
O0103b: $2N_{41a}\ 2N_{29"}$ / 12(months)
= $1N_{29"}$ per month
O0104c: $1N_{14}\ 1N_1\ 1N_{39a}$ / 12(months)
= $3N_{39a}$ per month

§16. The first line of each side, O0101 and R0101, have a similar format of four cases. In each instance, the scribe multiplies some number in the line to yield a quantity that is qualified by a larger time notation. Thus:

O0101b-c: $1N_{28}$ per day for 10 days is
$2N_{39a}\ 1N_{24}$

and

R0101b-c: $2N_1\ 1N_{24}$ per month for 12 months is
$4N_{14}\ 1N_1\ 1N_{39a}$

This interpretation of O0101b-c depends upon a meaning of U_4+$1N_{57}$ that is proposed in §17 below. The latter calculation, which in N_{39a} would be read as $10\ ^1/_2 \times 12 = 126$, leaves no doubt as to the mathematical skills of this fourth millennium scribe.

§17. One of the perplexing aspects of time notation on this tablet is the deliberate use of signs representing 12 months and 1 year in different cases. While no suitable interpretation exists now, Langdon and Falkenstein would have been confident (and probably incorrect) in asserting that U_4+$1N_{57}$ and U_4+$2N_{57}$ always represented one and two days, respectively (Englund 1998: 121, n. 255). Evidence from other attestations has led to consensus that these N_{57} represent a year rather than a day. This tablet seems to cast some doubt on this interpretation, as dates qualified by N_{57} are invariably accompanied by small quantities of grain. Perhaps N_n U_4+nN_{57} is best translated here as "(at a daily rate of) N_n over n years". At the moment, we cannot speak with confidence about this.

§18. There are more possible relationships within the tablet. R0101a would be identical to O0101b if no sign was lost from R0101a. We might also note:

R0101a: $1N_{28} = {}^1/_{20} \times 1N_1$
R0101b: $2N_1\ 1N_{24} = 2N_1 + {}^1/_{20} \times 2N_1$
R0101c: $4N_{14}\ 1N_1\ 1N_{39a} = 4N_{14} + {}^1/_{20} \times 4N_{14}$

The significance of these relationships, if any, is unknown.

§19. Although a comprehensive translation of the text is impossible, because of damage and the characteristic lack of context, we know that the tablet is a documentation of grain quantities and times. The utilitarian nature of these tablets suggests that the items mentioned here represented one or more transactions of goods that were either delivered or received, or perhaps they had only been ordered or promised.

§20. While much can already be learned and understood from this unusual archaic document, this and other very early tablets have yet to yield all their secrets. Given that the present analysis of this text would have been impossible even twenty years ago, the future of proto-cuneiform study appears bright.

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