

Twelve cuneiform *tenû* numerals

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1 Summary

This document proposes filling the Cuneiform Numbers and Punctuation block with twelve cuneiform numerals used in the third millennium.

Three of those are additional numerals in the AŠ (or DIŠ) *tenû* series, 7↖¹–9↖, where 1↖ = ↖ through 6↖ = ⇝ are already encoded. Their glyphic range and usage, as well as possible reasons for their absence in the current version of the Standard, are discussed in §3. The other proposed characters constitute a new series of numerals, formed by ↖ numerals crossing an ← wedge. They are discussed in §4.

These characters are extensively used in Early Dynastic administrative corpus, which is published online² using Unicode cuneiform as part of the [ePSD2] project. They are also used in publications discussing third millennium administrative texts, see, *e.g.*, Figures TODO.

2 Proposed changes to the Standard

2.1 Core specification text

No change is needed in the core specification.

2.2 Code charts

The code charts for the affected block, including the character names list with proposed informative aliases, cross references, and informative notes, are shown on the following pages. A plain text file containing the [NamesList.txt](#) lines is attached to this document.

2.3 Properties

Add to the respective UCD files the lines given in this section. These are available as plain text files attached to this document. Changes to derived files are not listed.

¹We follow [[Gor23](#); [Gor24](#)] and use unit numerals rather than sign names in transliterations to indicate the type of numeral. Contrary to Gori, we use write the multiplicity of the sign rather than its value, as in ATF; thus 3↖ for both 3(bur₃) and 3(u), rather than 30↖ for the latter.

²See, *e.g.*, the transcription of [[P220703](#)] in <http://oracc.org/epsd2/P220703/cuneified>. Note that the proposed characters, as well as the provisionally assigned ones proposed in [[L2/24-210R](#)], are missing from that text; *cf.* <http://oracc.org/epsd2/P131747/cuneified> for the Ur III [[P131747](#)], which does not have this issue.

2.3.1 Name, General_Category, Numeric_Value, etc.

2.3.2 Line_Break

2.3.3 Script

2.3.4 Script_Extensions

2.3.5 Block

3 DIŠ *tenû* numerals

This section discusses the following proposed characters:

- U+1246F 𒉗 CUNEIFORM NUMERIC SIGN SEVEN ASH TENU
- U+12475 𒉘 CUNEIFORM NUMERIC SIGN EIGHT ASH TENU
- U+12476 𒉙 CUNEIFORM NUMERIC SIGN NINE ASH TENU

3.1 Name

The existing numerals in the 𒉂 series are named U+12039 𒉂 CUNEIFORM SIGN ASH ZIDA TENU for the first one and U+1244A–U+1244E 𒉂–𒉔 CUNEIFORM NUMERIC SIGN *n* ASH TENU for the others.

Some³ technical terms used in cuneiform character names are derived originate from the structural descriptions of cuneiform signs by Akkadian-speaking scribes in late second and first millennium lexical texts. [TODO(egg): Cite Yushu Gong on *tenu* itself] In particular, the word *tenû* is used to describe slanted signs or parts of signs: thus 𒉂 is described as 𒉂 *tenû* in [P365233]⁴, 𒉗 as 𒉗 *tenû* in [P391514; P467315], 𒉘 as 𒉘 *tenû* in [P391514], 𒉙 as 𒉙 (containing) — *tenû* in [P365267]⁵. In most cases, the direction of the slant not explicitly specified. The terms *kaba tenû* and *zida tenû*, from Sumerian 𒉈 gab₂ “left” and 𒉉 zid “right” respectively, are used in [P345960], which contrasts 𒉂 described as *kaba tenû* and 𒉂 described as *zida tenû*.

In modern transliteration, 𒉂 numerals are described as — *tenû* (ATF: asz@t) or 𒉂 *tenû* (ATF: disz@t), the latter being more common⁶. Informative aliases using *diš tenû* have been recommended for the existing characters in [L2/24-239]. The proposed names use ASH TENU for consistency with the already-encoded characters, and the proposed annotations include informative aliases with *diš tenû*.

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b) DIE SCHIEFEN KEILE UND DIE WINKELHAKEN (für die Einheiten von 1-9, neben den senkrechten keilförmigen Zahlenzeichen).

a) bei I^{v} : RTC. 276: Bart. III 118, 249: 3 gín igi-4-gál še.

Legr. TRU. 310: ud- kam.

Gen. TD. 5487: áb.

b) vor kam und àm:

Bart. III 152, 398: dub--àm

Legr. TRU. 42: a-du--kam

a-du -kam

a-du -kam

a-du -kam

Legr. TRU. 346: 1 māš-qal-še -kam-uš

1 udu-še -kam-uš

Siehe: itu-šu--ša; itu šu--ša; itu šu--ša.

c) nach gud, áb, anše, zur Bezeichnung des Alters.

ITT. III, II 4956: 20 áb--še 3 qa-ta

ITT. III, II 6090: 3 anše-sal- I^{v} ; 1 anše-nita I^{v} ;

Pinch. AT. I. 53: 3 gud I^{v} ; 1 áb I^{v} ;

Bart. III 106, 191: 3 anše-nita

ITT. II, I. 6965: 20 zu-gud- 15 zu-gud .

Figure 1: [Sch35, p. 135]

b) GEBRAUCH VON I^{v} .

ITT. IV. 7164 *: I^{v} = 20 minus 3 = 17.

CT. 10, 24964: I^{v} = 40 minus 4 = 36.

Gen. TD. 5670: I^{v} = 240 minus 2 = 238.

Nota: Pgl. im römischen Zahlen-
system: IX = X minus I; XIX =
XX minus I; ferner die la-
teinischen Ausdrücke:
undeviginti = 20 minus 1; duodeci-
ginta = 30 minus 2.

Figure 2: [Sch35, p. 132]

3.2 Ur III usage

As described in [Sch35, p. 135] (see Figure 1), slanted signs are used in Ur III economic texts primarily in subtractive notation with $\text{I}^7 \text{lal}^8$, as well as for ordinals⁹ and for ages of animals in years¹⁰.

Accounts of animals giving their ages in years rarely go beyond three-year old animals. Subtractive notation, which appears in the ED IIIa period [Rob08, p. 77], is used to compactly express numbers close to a larger round number, *e.g.*, IK 10 – 1 instead of III for 9, KKI 30 – 2 instead of KKII for 28, or IK 60 – 1 instead of KKV for 59; *cf.* IX instead of VIII in Roman numerals. It is therefore usually limited to small subtrahends¹¹. Larger subtrahends do occur for quantities close to a much larger unit; however in Ur III, they are often written I numerals, as in [P109346] $\text{W}\text{I}\text{M}\text{I}\text{K}\text{W}\text{K}\text{A}$ “4 shekels minus 7 grains of gold”, a weight which would otherwise be written $\text{III}\text{I}\text{M}\text{I}\text{K}\text{W}\text{K}\text{A}$ “3 + $\frac{2}{3}$ shekels and 53 grains”, as $180\text{K} = 1\text{M}$.

Ordinals with \textwedge numerals are also typically limited to small numbers or subtractive notation: many of the attestations of $n\text{\textwedge}\text{K}$ “nth” are in year names¹², such as $\text{KK}\text{I}\text{K}\text{A}\text{K}\text{I}\text{K}$ IKI KAK mu kar₂-har^{ki} a-ra₂ 2 \textwedge -kam-aš ba-hul “year Karhar was destroyed for the second time” (31st year of Šulgi’s reign), $\text{KK}\text{I}\text{K}\text{A}\text{K}\text{I}\text{K}$ IKI KAK mu si-mu-ru-um^{ki} a-ra₂ 3 \textwedge -kam-aš ba-hul “year Simurrum was destroyed for the third time” (32nd year of Šulgi’s reign), or $\text{KK}\text{I}\text{K}\text{A}\text{K}\text{I}\text{K}$ IKI KAK IKI KAK mu si-mu-ru-um^{ki} u₃ lu-lu-bu-um^{ki} a-ra₂ 1 \textwedge lal 1 \textwedge -kam-aš ba-hul “year Simurrum and Lullubum were destroyed for the ninth time” (44th year of Šulgi’s reign). Larger ordinals are frequent, in particular for the day of the month, but these are written with I numerals, thus KWK for “the 7th day” or $\text{K}\text{K}\text{W}\text{K}$ for “the 28th day”.

The rarity of the higher \textwedge numerals in the Ur III corpus likely explains the absence of $7\text{\textwedge}-9\text{\textwedge}$ from the répertoire of Unicode Version 5.0, which was aiming to encode a répertoire appropriate for the Ur III period and later.

3.3 Early Dynastic usage

The situation is different in the Early Dynastic corpus. As described in [L2/24-210R], \textwedge numerals are used in many Early Dynastic metrological systems, and in particular

³TODO also note gunū but contrast CROSSING rather than gi-li-mu-u, SQUARED rather than li-mu-bu-i-gi-gu-ub-bu-u2

⁴Note that while the third millennium L and L are related by a 45° rotation, in the Neo-Assyrian style used by this list, these signs look like I and F , so that only one wedge is slanted, as noted in [Gong2000].

⁵TODO something on spelling out names ga-na te-nu-u_2 and $\text{še te-nu-u}; ku te-nu-u$, etc.

⁶For an example of a transliteration using aš tenū, see [Greco2021]; note that only the HTML version uses aš tenū, the PDF uses diš.

⁷As noted in [L2/24-210R, p. 25 n. 40], the sign I (lal, “minus”) is often ligated with the following numerals, with the subtrahend placed under a sometimes considerably enlarged I , similar to the layout of the radical in modern mathematical notation, *see, e.g.*, [Po20092, rev. 3 1, 2]. The font used in this document ligates or kerns \textwedge subtrahends, but does not enlarge the I .

⁸Also transliterated la₂, as in [CDLI]. In the transliterated Ur III corpus on [CDLI], out of 3304 occurrences of (disz@t), 1971 are in $\text{I}n\text{\textwedge} 1a2 n(\text{disz@t})$.

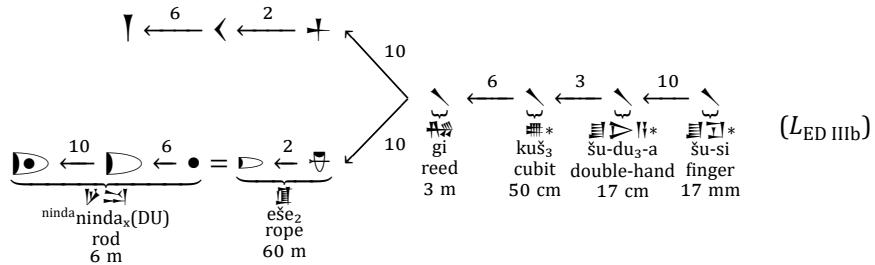
⁹1583 out of 3304 occurrences are $n\text{\textwedge}\text{K} n(\text{disz@t})\text{-kam}$, including 647 after I

¹⁰203 occurrences of gu4, ab2, ansze, or dur3 $n(\text{disz@t})$

¹¹Of the 1971 Ur III occurrences of la1 $n(\text{disz@t})$, 1930 are with $n \leq 2$, of which 1823 with $n = 1$.

¹²430 occurrences of $n(\text{disz@t})\text{-kam}$ are on lines starting with mu , of which 308 are in IK .

in the Early Dynastic IIIb length system



A similar situation occurs in some systems of capacity with numerals counting \aleph \aleph_1 \aleph_2 , so that \aleph and \aleph_1 are attested, see Figures 7 and 8.

The use of \setminus numerals for ordinals, especially for days, is more prevalent in the Early Dynastic period than in the Ur III period, and the use of subtractive notation is less frequent¹⁴. in these numbers. We therefore find attestations of $\setminus\setminus$ in “nth day”, some of which are shown in Figures 9–13.

In Ebla, the \setminus numerals are primarily used in subtractive notation, see [Gor24, p. 88 n. 298, p. 120 n. 465, p. 167 n. 739, p. 180 n. 801]. However, contrary to Ur III, \setminus numerals remain used for large subtrahends, thus [Gor24, p. 101 n. 355] cites occurrences of for 36 and for 94. In particular, [Gor24, pp. 129 sq.] cites occurrences of $\setminus 9 \setminus$ in Ebla, shown in Figure 14.



Figure 3: 『¹⁶ 『 』 』 “501 m (first) width” (of a field) in [P221254] from Nirsu, dated to the reign of 『 』 『 』 『 』 . Left: Copy from [AllottededelaFuyé1920]. Right: [CDLI] photograph.

¹³Of those, 34 have and 9 have .

¹⁴ Although also attested, see, e.g., [P221346] 𠁥𠁦𠁥, [P221006] 𠁥𠁦𠁥-𠁦

¹⁵ Recall that 𒌩 𒂅 mi-at is Eblaite for “hundred”, see [Arc15, p. 33; L2/24-210R, p. 27].

¹⁶TODO something about rhomboidal numerals, cite [Gor24].



Figure 4: ፳፻፻ ፲ “21 m of reed-bed dyke” (attributed to ሚኒስክ the farmer) in [P221266, obv. 11] from Nirsu, dated to the reign of ዘመን ቅድ. Left: Copy from [AllottededelaFuye1920]. Right: [LouvreCollections] photograph.



Figure 5: “1344 m, its height 2 m” (dimensions of a dyke on the river) in [P020303] from Njirsu, dated to the reign of . Left: Copy from [Marzahn1991]. Right: [CDLI] photograph.



Figure 6: 𠂔 𠂔 𠂔 “444 m equal widths” (of a field) in [P221254]. Left: Copy from [AllottededelaFuye1920]. Right: [CDLI] photograph.



Figure 7: “1 nirbanda 7 sila of butter, 1 sila of cream, 7 sila of dates” in [P020182, rev. 3 5–7] from Nirsu, dated to the reign of Left: Copy from [För16]. Right: [CDLI] photograph.

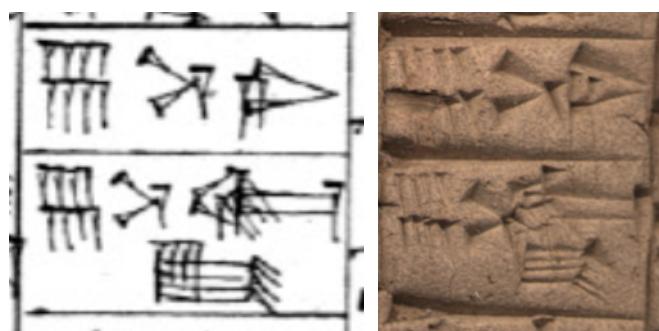


Figure 8: “8 sila of butter, 8 sila of dates” in [P221730] from Nirsu, dated to the reign of Left: Copy from [Никольский 1908]. Right: [CDLI] photograph.



Figure 9: “seventh day” in [P220703] from Nirsu, dated to 3rd year of the reign of Left: Copy from [AllottededaFuye 1918]. Right: [LouvreCollections] photograph.



Figure 10: 𠂔 𣎵 𠂔 𠂔 “seventh day passed” in [P221590] from Nippur. Left: Copy from [Westenholz1975]. Right: [CDLI] photograph.



Figure 11: 𠂔 𣎵 𠂔 “eighth day” in [P220703]. Left: Copy from [AllottededelaFuye1918]. Right: [LouvreCollections] photograph.



Figure 12: 𠂔 𠂔 𣎵 𠂔 𠂔 “ninth day passed” in [P452986], dated to the ED IIIa period. [CDLI] photograph.

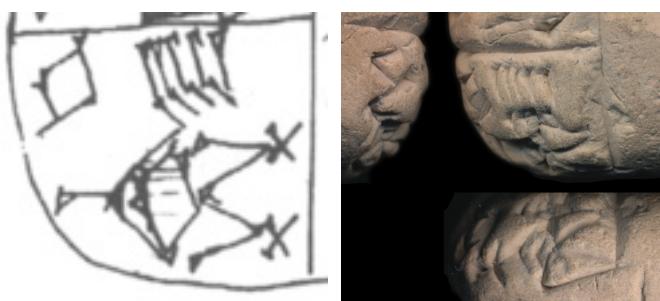


Figure 13: ☈ “ninth day” in [P222129] from Šuruppag, dated to the ED IIIa period. Left: Copy from [Martin2001]. Right: [CDLI] photograph.

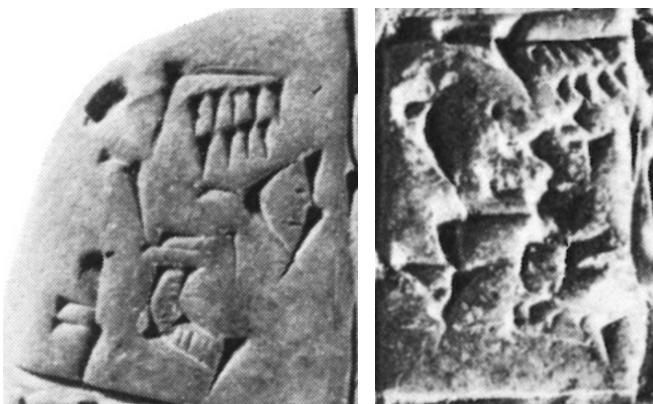


Figure 14: Left: • ॥ ॥ ॥ ॥ ॥ “9 minas and 51 shekels of silver” in [P241283]; right: ॥ ॥ ॥ ॥ ॥ “1 mina and 51 shekels of silver” in [P241325], both from Ebla. Photographs from [EbDA].

3.4 Glyphic range

As illustrated in the above figures, the angle of the \wedge varies, and is not always faithfully reproduced in copies. The representative glyphs retain the same angle used for the already-encoded numerals.

The stacking patterns for the proposed characters do not vary among the attestations cited above. Note that stacking patterns are known to vary for other numerals in this series; for instance, ፩ and ፪ sometimes appear with all wedges in a row in ED IIIa tablets, as in [P010787; P010896; P010928]. As discussed in [L2/24-210R, pp. 45 sqq.], the disunification of variant stacking patterns poses problems when producing cuneiform text from transliterated corpora, as the stacking patterns are not normally indicated in transliteration, and the default stacking pattern varies over time: 弌 in Ur III, 弌 in Neo-Assyrian. While I and — numerals needed to have their stacking patterns disunified for compatibility with [Bor10], this practice should not be extended to ፩ numerals.

4 AŠ×(DIŠ *tenū*) numerals

This section discusses the following proposed characters:

- U+12477 ← CUNEIFORM NUMERIC SIGN ASH TIMES ONE DISH TENU
 - U+12478 ← CUNEIFORM NUMERIC SIGN ASH TIMES TWO DISH TENU
 - U+12479 ← CUNEIFORM NUMERIC SIGN ASH TIMES THREE DISH TENU
 - U+1247A ← CUNEIFORM NUMERIC SIGN ASH TIMES FOUR DISH TENU
 - U+1247B ← CUNEIFORM NUMERIC SIGN ASH TIMES FIVE DISH TENU
 - U+1247C ← CUNEIFORM NUMERIC SIGN ASH TIMES SIX DISH TENU
 - U+1247D ← CUNEIFORM NUMERIC SIGN ASH TIMES SEVEN DISH TENU
 - U+1247E ← CUNEIFORM NUMERIC SIGN ASH TIMES EIGHT DISH TENU
 - U+1247F ← CUNEIFORM NUMERIC SIGN ASH TIMES NINE DISH TENU

4.1 Name

As indicated by their name, these signs consist of a horizontal wedge (AŠ) with an overlaid \nwarrow numeral. Their ATF name is $n(|ASZ\times DISZ@t|)$, as ATF numerals are of the form $n(\langle\text{name}\rangle)$. Since we have no such restriction in Unicode character names, we move the number before the DISH TENU to better describe their structure. These numerals are not described in terms of AŠ *tenū*, so we follow [CDLI] and [OSL] terminology instead of attempting consistency with the names of the \nwarrow series.

4.2 Usage

These numerals are used in the Early Dynastic IIb period to indicate regnal years. They are extremely well attested, with 1482 artefacts containing (|ASZxDISZ@t |) in the current transliterated [CDLI] corpus. Almost all attestations are from Nirsu, and most of them are in regnal years of 𒃲 𒃶 𒃵 𒃷 and his predecessor 𒃲 𒃶 𒃵 𒃷, but their use is also attested in regnal years of earlier rulers in the first dynasty of Lagaš: 72 tablets dated to the reign of 𒃲 𒃶 𒃵 𒃷, [P247594] possibly¹⁷ dated to the reign of 𒃲 𒃶 𒃵 𒃷 the second, [P222224] to the reign of 𒃲 𒃶 𒃵 𒃷, and [P221783] from Lagaš to the reign of 𒃲 𒃶 𒃵 𒃷 the first.

Whree attested¹⁸, regnal years beyond the ninth are written differently: 𠂇 for 10 𢃉𢃉𢃉𢃉 in [P222640], and with subtractive subtraction for 17 𢃉𢃉𢃉𢃉¹⁹ written 𢃉𢃉 in [P221483] and 19 𢃉𢃉𢃉𢃉 written 𢃉𢃉 in [P221413; P222223].

¹⁷Dated instead to the reign of by [SallabergerSchrakamp2015].

¹⁸The length of the reign of 𒊩𒌆 * 𒂗 (6 years and 1 month) and the dearth of documents dated to the reign of 𒊩𒌆 * 𒂗 after his defeat by 𒊩𒌆 * 𒂗 mean that these are quite rare; see [SallabergerSchrakamp2015].

¹⁹This text mentions 𢃠𢃤 𢃠𢃤 as temple administrator. See [SallabbergerSchrakamp2015] for its attribution to the reign of 𢃠𢃤.

A connection of **IM** with the later usage of **im(.ma)** (presargonic Lagash and later; Akkadian **šaddaqdi/a(m)** with lexical equivalent **MU.IM.MA** [MSL 5, 65:195]), meaning “previous (year)” is not apparent. For the latter usage cf. particularly DP 280 (= 281), a presargonic temple document which “loads onto the backs” (**gu₂.ne.ne.a.e.ne.gar**) of the fisheries foremen **Ne.sag** and **Lugal.ša₃.la₂.tuku** the quota arrears of **im.im.ma.kam** , **im.ma.kam**  and **mu.a.kam** , that is of the year before last = year one (of the king **Urukagina** [second regnal year]), of last year = year 2 and of this year = year 3. Also DP 243 goats of various colors / **maš im.ma.kam** / ditto / **maš mu.a.kam** and DP 94. **maš im.ma** as delivery arrears noted after grown nannies (uds) and before **maš ša₃.hi** (/mu.a.kam, “of the current year”), further **maš im.ma** = **maš gal.gal** in the summation rev i2 (see footnote 17 to the notations of the type ). A parallel usage is found in the Old Akkadian text ITT 2/1, 3078 obv 1-4. 3 1/2 **ma.na siki** / [i]m.ma.kam / 1 **gu₂** **la₂.4** **ma.na siki** / **mu.a.kam**. It would seem difficult to reconcile this clear usage **im** = “previous year” with the often translated **im** = “account tablet” (**im** = clay)

Figure 15: TODO

<https://cdli.mpiwg-berlin.mpg.de/artifacts/452986/reader/209489> <https://cdli.mpiwg-berlin.mpg.de/artifacts/467743/reader/213564>

4.3 Glyphs

4.4 Later usage

The subsequent **mu-itî** system, which saw limited use at the end of the presargonic and the beginning of the Old Akkadian periods, seems, on its surface, to be a rational development from the system it replaced; the *basis* of a 30-day month carries on (cf. for instance the texts B. Foster, **Umma in the Sargonic Period** [Hamden 1982] pl. 18, Nr. 37, discussed by J. Friberg, *Scientific American* 250/2 [Feb. 1984] 114 and Foster, *ASJ* 4 [1982] 43 obv iii9-11) and, for a period at least, a graphically comparable method of representing year dates, with now vertical strokes impressed on either side of the long horizontal, was used (the date of the text BIN 8, 117,  + , which both Powell, *HUCA* 49, 9 and B. Foster, *Or.NS* 48 (1979) 156 and USP p. 7 read 7 (mu) 1 (iti) 7 (ud), should be registered with some scepticism). Only here is the refinement of day added, so that documents

Figure 16: TODO note that this should cite BIN 8, 116, not 117.

Acknowledgements

The *CuneiformComposite* font by Steve Tinney is used when referring to the reference glyphs for already-encoded cuneiform. *Noto Sans Cuneiform*, by Monotype Imaging, is used to for most of the cuneiform text in this document, with modifications (cuneiform glyph for \diamond ŠAR₂, corrected glyphs for  UN and  KALAM per [Uni16], alternate glyph  for $\{\}$). Arabic text is set in *Scheherazade New* by SIL International; Traditional Chinese text is set in *Noto Serif TC* by Ken Lunde et al.; monospace text is set in *Consolas* by Luc(as) de Groot; the remainder of the text is set in *Cambria* and *Cambria Math* by Monotype Imaging and Tiro Typeworks.

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