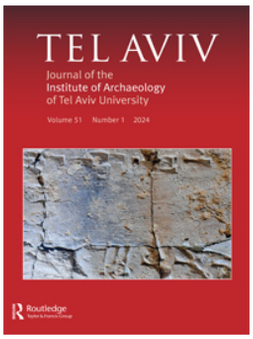

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Archaeo-Material Study of the Cuneiform Tablet from Tel Beth-Shemesh

Cécile Fossé, Jonathan Yogev, José Mirão, Nicola Schiavon and Yuval Goren*

Abstract

The Fifth Haverford excavation season at Tel Beth-Shemesh (Ain Shams) in 1933 revealed a fractured tablet bearing a cuneiform inscription dating to the Late Bronze Age. Considered to be the earliest alphabetic cuneiform text uncovered in the Canaanite arena outside of Ugarit, this tablet quickly became the focus of many studies. Later readings suggested that this was the earliest example of a South Semitic Alphabetical sequence. Through petrographic material analysis, the present study examines the possible location of production of the tablet and discusses the implications with regard to the object's function and cultural context.

Keywords

Beth-Shemesh; Late Bronze Age; Cuneiform tablet; Ugarit; South Semitic Alphabet; Epigraphy; Archaeometry; Provenance study; Clay mineralogy; Petrography

Introduction

The Fifth Haverford excavation season at Tel Beth-Shemesh (Ain Shams) in 1933 revealed at the base of the south wall (Room 526 III) a fractured tablet bearing a cuneiform inscription, dating to the Late Bronze Age (Grant 1933; 1934: 27, Pl. XX 4, Fig. 2A). This document became the focus of many studies. It is the earliest alphabetic cuneiform text ever to be revealed in the Canaanite arena outside Ugarit, and only two other examples of such writing have since been found in the Southern Levant (Fig. 1): one is a small inscription on a blade from Kokhav HaYarden (north of Beth-Shean), and the other is a small inscription on a tablet from Tel Taanach (Yeivin 1945; Hillers 1964). The Beth-Shemesh tablet gained much more publicity than the other two because of several extraordinary aspects, discussed below. The three artifacts from the Southern Levant join a few other alphabetic cuneiform texts found outside of Ugarit: in Hala Sultan Tekke,

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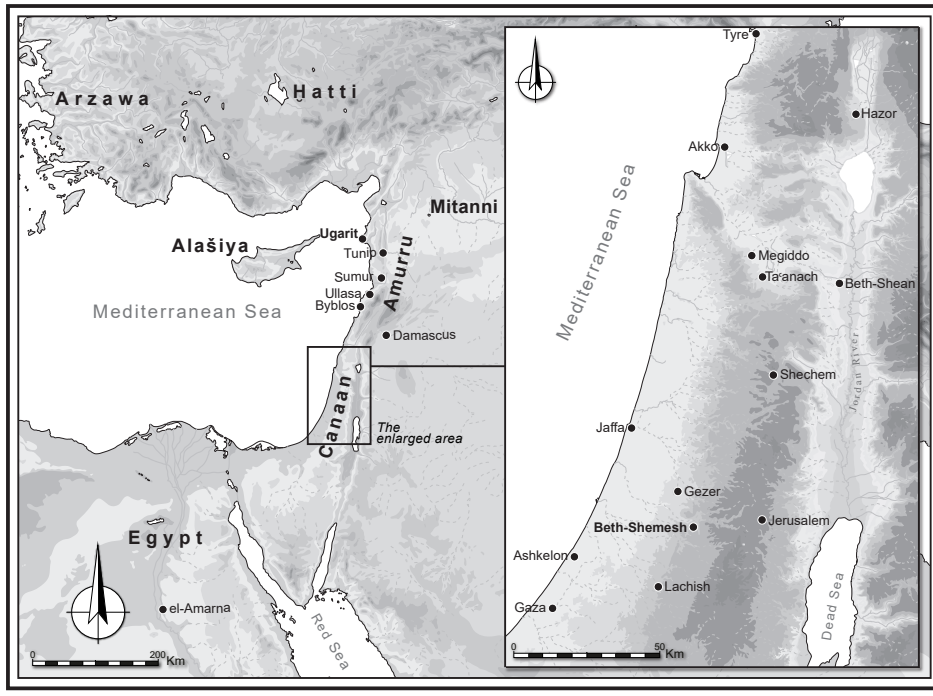

Fig. 1: Map of the Levant in the Late Bronze Age, showing the location of Ugarit and Tel Beth-Shemesh (prepared by I. Ben-Ezra)

Tell Nebi Mend/Qedeš, Kamid al-Loz, Sarafend/Sarepta and Tiryns (Dietrich and Loretz 1988: 205–238; Cohen, Maran and Vetters 2010).

During a joint interdisciplinary study of Southern Levantine documents on clay, the authors were allowed to conduct a thorough research of the Beth-Shemesh tablet (IAA No. 33.1867) in the Rockefeller Museum, Jerusalem, followed by a laboratory examination of several samples. The study included non-destructive testing (NDT) and minimally destructive testing (MDT) methods to enhance the information revealed by the epigraphic and palaeographic data.

Surface examination

The surface examination of the tablet was first conducted by the naked eye, followed by a detailed study under a high-resolution stereoscopic microscope (Fig. 2), using a range of magnifications (×6.5–×100) and several illuminations (oblique/incident monochromatic and plane-polarised light). A Zeiss Stemi 2000-C trinocular head stereo microscope equipped with a Nikon Coolpix 5000 camera was used to observe and record many features.

The tablet (Fig. 3) has an irregular, generally rectangular, shape (dimensions ca. 15 × 4.5 × 2.2 cm). The tablet becomes narrower towards the left part. It becomes thinner on both sides, forming a curve on the reverse, but remaining flat on the obverse—indicating that the scribe intended to write on only one facet. The tablet was found fractured and was restored more than once, with two types of plaster and perhaps some other media, over the nearly 90 years since its discovery.

Grant (1933) noted that it has an 'unusual shape'. Albright (1934: 19) suggested that it had a distinctive contemporaneous axe-head shape, generating a discussion about the origin of this style and method of formation. Albright *(ibid.)* and later Horowitz, Oshima and Sanders (2006: 157) compared it with the inscribed axe-heads from various sites, such as Ugarit, and argued that it was produced in an axe-head mould. However, besides the facts that the Beth-Shemesh tablet is made of clay and that its dimensions do not indicate a process of pressing into a mould of a typical metal axe, the inscriptions on the Ugaritic axe-heads, reading *rb khnm* ('High Priest'; *KTU* 6.6–6.9) and *ḫrṣn rb khnm* ('*Ḥrṣn* the High Priest'; *KTU* 6.10), probably indicate a ceremonial function as dedications to a deity or sacred deposits, whereas the Beth-Shemesh tablet seems to perform an entirely different role (for more on the Ugaritic axe-heads, see Dietrich, Loretz and Sanmartín 1974: 463; Lipiński 1988). Several lines of evidence suggest that the tablet was pressed into a mould; hence, this notion is entirely plausible. The fractures reveal the application of two lumps of clay: a major one and an additional slab, added along its side before the entire clay body was pressed into the mould. Albright (1934: 19) noted that its coarse clay is not suitable for writing by a stylus, and indeed, the overall design presumably reflects the work of an amateur, rather than trained, scribe. A comparison of the initial photograph published by Grant (1933) close to its discovery with images taken later that year reveals that the tablet had suffered further damage, apparently the result of some amateurish restoration (Sass 1991), thus making the interpretation of the inscription even more difficult. This damage

Fig. 2: Jonathan Yogev and the late Cécile Fossé recording the Beth-Shemesh tablet under the stereomicroscope at the Rockefeller Museum, Jerusalem (photo by Y. Goren, taken on July 3, 2019)

Fig. 3 : The Beth-Shemesh tablet; a) obverse; b) reverse (photos by Y. Goren)

was already evident when Albright examined the tablet; thus, his facsimile relied upon Grant's image (Albright 1934: 18).

Method

Previous petrographic studies and other physical examinations and chemical analyses of clay cuneiform tablets have provided an extensive database for the raw materials and techniques used to make such tablets in most parts of the ancient Near East. We may add petrographic samples of ceramics in thin sections from all over the eastern Mediterranean, studied during the last 40 years and kept in our collection of about 20,000 specimens. This database comprises comparative tablets and contemporaneous pottery from Ras Shamra–Ugarit (Goren, Finkelstein and Naʾaman 2004: 88–91), sites in the Ugarit impact areas, and other regions to which the tablet in question was attributed over the years.

For this reason, we concentrated on petrographic analysis of the tablet in an effort to characterise the mineralogy, lithology, and geology reflected by the fabric. Thin sections were prepared and examined by standard petrographic methods and descriptive procedure (as in Goren, Finkelstein and Naʾaman 2004: 4–16). The thin sections were made in the Laboratory for Microarchaeology at the Ben-Gurion University of the Negev and were examined under a Motic Panthera TEC-POL Epi microscope at magnifications between ×40 and ×600.

Results

Comparative data for the material analysis

Tel Beth-Shemesh is located in the heart of the Shephelah, the hilly lowlands between the Samarian-Judean anticline and the Mediterranean Coastal Plain of present-day Israel. The Upper Shephelah, where the site is situated, is built of low hills, rising ca. 400 m above sea level. The landscape is of a geological basin, typified by Palaeocene to Eocene chalk and marl, with varying amounts of chert. Tel Beth-Shemesh lies on top of the Taqiye formation

of the Palaeocene, with nearby exposures of the Adulam formation of the basal Eocene Age (Sneh *et al*. 1997; Sneh 2010). The Taqiye formation consists of chalky shales, green to grey in colour and locally gypsiferous, and a hard bank of silicified chalk capped by chalky shales. Palaeocene shales are almost constant in their stratigraphic position and even in composition details throughout the Levant (Bentor 1966: 73). The Adulam formation comprises chalk and chalky limestone with alternating thin chert layers. Calcrete (locally termed *nāri*) caps both formations (Itkin *et al*. 2012).

The environment of Ras Shamra–Ugarit differs markedly from that of the Southern Levant; consequently, the raw materials that typify ceramics made there are different from those of the Southern Levant. The immediate surroundings of Ras Shamra–Ugarit are characterised by lower to middle Quaternary marine sediments, including shelly limestones, sandstones, conglomerates and calcareous tuffs. Further inland, 1–2 km south and east of the site, one finds younger (upper Quaternary) clays, loams, limestones and sands (Ponikarov *et al*. 1966, sheets I-36-XXIV; I-37-XIX, Geological Map of Lataqia 1:50,000). Several kilometres north of the site lies the ophiolitic complex of Baër-Bassit. Ophiolites are sections of Earth's oceanic crust and the underlying upper mantle uplifted and exposed above sea level. They form in a tensional submarine environment where a plentiful supply of near-surface basaltic magma is readily available. Geophysical evidence indicates that such requirements are met at oceanic ridges. Many studies suggest that ophiolites are land-bound fragments of the oceanic lithosphere formed at fossil constructive plate margins. 'Le croissant ophiolitique peri-Arabe' (Ricou 1971) refers to an arcuate band of ophiolites from Oman to Cyprus, marking the suture between Africa (or Arabia) and Eurasia. The peri-Arabian ophiolites represent the Tethyan oceanic lithosphere of the Upper Cretaceous age that are deposited on top of the adjacent Arabian continental margins shortly after forming an oceanic spreading centre. In their western compartment, they include the Troodos ophiolite of Cyprus, the Mersin and Pozanti-Karsanti massifs of Cilicia, the Kizildağ massif of Hatay Province, Turkey, and the Baër-Bassit massif of northwest Syria. The typical rock types include fine-grained ocean sediments. Below, pillow basalts overlie a sheeted layer of dolerite; under that is gabbro; under it are olivine gabbro, pyroxenites and peridotites. Lower levels of the ophiolite complex also include harzburgite, which is commonly serpentised (Whitechurch, Juteau and Montigny 1996). The Baër-Bassit massif of northwest Syria, neighbouring Ugarit, lies south of the Kizildağ massif, with the lower valley of the Orontes River and the Plain of Antioch separating the two (*ibid*.).

A micaceous serpentine-rich clay matrix characterised the cuneiform letters sent from Ugarit to Egypt from the Amarna archive. The inclusions contain solitary mineral fragments of the pyroxene, olivine, serpentine, and amphibole groups, with fewer volcanic rocks, quartzite and limestone fragments. Also very typical of this group are fragments of radiolarian chert, often stained by iron minerals. Thus, the characteristics of this group indicate a source environment on the margin of an ophiolite complex (Goren, Finkelstein and Naʾaman 2004: 88–91). This data also relies on a reference collection of thin sections that one of us (Y.G.) produced from about fifty well-contexted, typologically identifiable, Middle to Late Bronze Age ceramic vessels from Ras Shamra, and 24 cuneiform tablets

from Ugarit, including international letters, legal, economic and school texts. Together with the detailed geological mapping of the area, these data supplied all the necessary comparative information to check whether the materials of the Beth-Shemesh tablet are comparable with those from Ugarit.

Composition of the Beth-Shemesh tablet

A petrographic examination of the Beth-Shemesh tablet points to a very indicative fabric (Fig. 4). The matrix is silty (10%), calcareous, yellowish-tan in PPL, and optically active with a speckled b-fabric. The silt is well sorted and contains mainly quartz and a recognisable quantity of other minerals, including hornblende, augite, zircon, plagioclase, microcline, biotite, muscovite and epidote. Opaques are relatively common (2%–3%), sizing between a few micrometres to about 60 µm. The temper (or inclusions) contains sparsely distributed sand-sized grains of chalk and calcrete. Due to their low quantity within the clay body, we may assume that these inclusions were not added intentionally but occurred naturally within the silty loam. With the abundance of silt in the clay body, acting as natural temper, no addition of other non-plastics was necessary.

The petrographic traits of this tablet are categorically different from those of the tablets and pottery vessels of Ras Shamra–Ugarit and the north Syrian littoral area in general. Based on most published data, however (Goren, Finkelstein and Naʾaman 2004: 112–113 with references), the matrix is readily identified as loess soil, typical of the Southern Levant. The Levant loess soil occurs mainly in the semi-arid zones of the northern Negev and the southern Shephelah. In pottery assemblages belonging to this group, the inclusions accompanying the loess matrix are variable and indicate different geological environments within the area where loess soil occurs. Loess with inclusions in which limestone is the dominant component is prevalent mainly at sites northeast of the Beer-Sheva Valley. In the southern Shephelah, conversely, chalk sand, often with calcrete, is usually the dominant—or even sole—non-plastic component. In the northwestern Negev sites, quartz is the principal constituent. When quartz sand dominates the inclusions, sand-sized grains of accessory minerals, mainly hornblende, zircon, feldspar and augite, commonly accompany it. These indicate a littoral origin of the Southern Levant (*ibid*.).

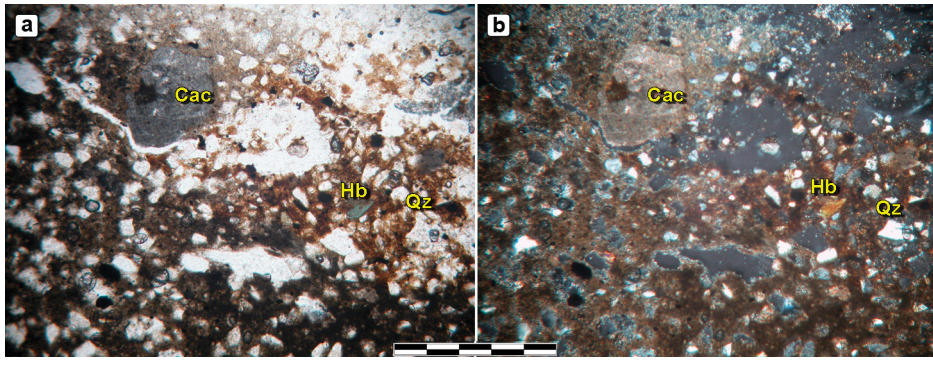

Fig. 4: Photomicrographs of the Beth-Shemesh tablet; a) in PPL; b) XPL; Cac = calcrete; Qz = quartz; Hb = hornblende (scale bar length: 1 mm)

The matrix of this tablet combines the petrographic properties of loess (silty-carbonatic, wind-blown clay loam) and brown Rendzina soil. The inclusions contain *nāri* from the mother rock of the Rendzina soil, some wind-blown quartz sand and artificially added straw. Brown Rendzina soils occur with pale Rendzina soils in the semi-arid to sub-humid Mediterranean climate. The distribution of the two soils is related to catenary differentiation (Dan *et al*. 1972). The brown Rendzina derives from the calcrete crust. This soil material eroded the downslope, forming colluvial-alluvial soils and grumusols. The amount of soil material resulting from the weathering of the calcrete is low, and relatively large amounts of aeolian dust contribute to the formation of the brown Rendzina soil. The combination of Rendzina-loessial soil with chalk and calcrete inclusions is known from several sites in the southern Shephelah. Thus, the materials in this tablet reflect the geology of the environment of the location of its discovery.

While the results cannot establish decisively that this tablet was produced in Beth-Shemesh, they indicate a local production in the general area of its discovery. This conclusion must be discussed now concerning the many interpretations that surround it.

Epigraphic analysis

Previous transliterations

The direction of writing is from right to left, which is uncommon but not rare in alphabetical cuneiform texts (Virolleaud and Dussaud 1934; Virolleaud 1960; Yogev and Yona 2014). The writing begins at the upper right corner and continues counter-clockwise along the margins of the tablet. Fortunately, the discovery of the cuneiform alphabet in Ras Shamra–Ugarit in the late 1920s was made shortly before this tablet was found. Albright immediately noted the resemblance between the Ugaritic characters and those of the Beth-Shemesh tablet and attempted to read the text using a mirror since the direction of writing was new to him (Albright 1934: 18). By 1933, most of the Ugaritic alphabet had been deciphered and could be used to interpret the inscription. Barton (1933) has transliterated the text as: 'line 1: *ʾel ḫt qb*(?)*t rty qt*(?)*mt*(?) line 2: *t ʿṣ*(?) *g*(?)*l mḫt*'. He referred to it as 'a prayer inscribed to be placed in the sanctuary of a god, probably El' and translated: line 1: 'O El, cut through the backbone of my stammering! I desire' line 2: '(that?) thou shalt remove the spring of the impediment…'.

Albright (1934) noted the letters are slightly different from the Ugaritic ones and believed that the text might represent a Canaanite dialect. He transliterated the text as: '*h-l ḫ-t-q k*(?)-*r-t h-t*[----] *q*(?) [--] *d*-?-?-*t*(?)[ ]'. Later, he published a second interpretation of the text and suggested that the tablet was an amulet that mentions the birth goddess (Albright 1964). He read: '*hl ḫtq Kṯrt hqn*y [ʾaṯṯ(?)] d*t* w(?)*dm mt* [l]h'; 'Truly, O birth goddesses, enter (her belly?), Cause this [woman] to produce (offspring), And drive out Death from her!'

Hillers (1970) noted that a certain 'pit' (Fig. 5, nos. 6–7) that appears twice in the inscription is similar to characters that occur on several Ugaritic tablets and represent both letters *š* and *ṯ* in the short alphabetical version.

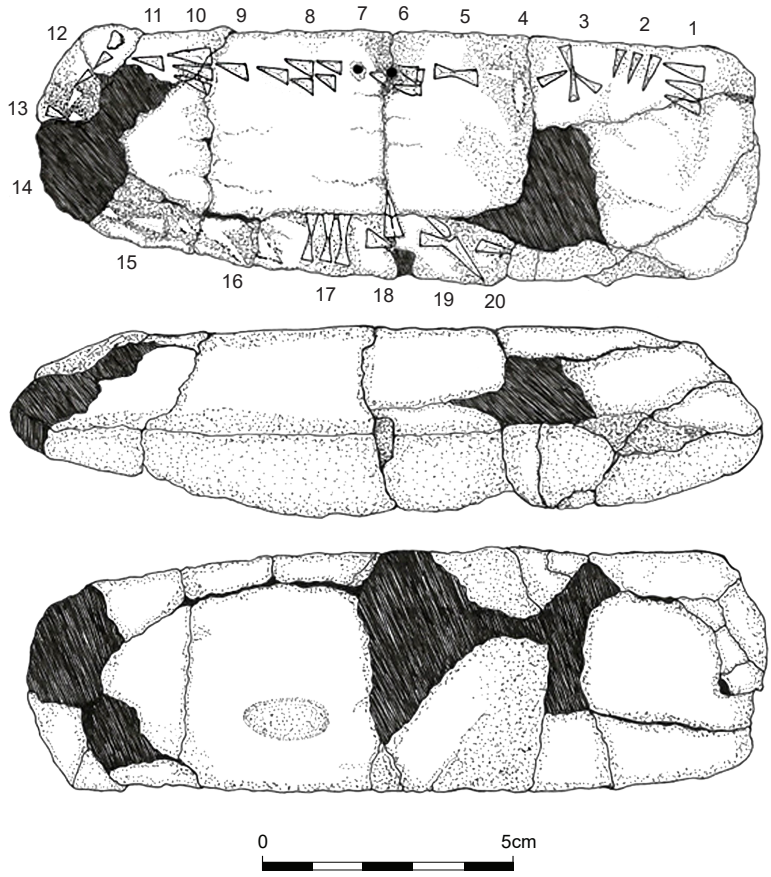

Fig. 5: Facsimile (J. Yogev)

Puech (1986: 207) suggested a slightly different transliteration to the text: '*h l ḥ m*(?) *q s t š r t h t n y* [r] *q*(?)/ʿ(?) *m*(?) ʿ/*g d m ṯ z p t*/*m*(?)'. This was a turning point for the interpretation used by Loundine (1987) to suggest that the text is one of the earliest examples of a South Semitic Alphabetical sequence; he transliterated it as '*h l ḥ m q w š r t k n s*(?) [f] ʾ(?) ʿ *ḏ*(?) *g d*(?) *ṯ z*(?) [y ṣ]'. Most examples of the South Semitic sequence (*h-l-ḥ-m*) are found in South Arabian inscriptions from the 9th century BCE onward, but some are dated to the mid-15th century BCE in Egyptian syllabic writing (Fischer-Elfert and Krebernik 2016; Haring 2015; Schneider 2018; Quack 2003). It is also partially preserved in modern Geʿez script (Honeyman 1952; Naveh 1982: 43–52).

Based on several pieces of evidence, Ryckmans (1981) restored the South Semitic alphabet as follows: '*h l ḥ m q w š r b*(ġ?) *t s k n ẖ ś f* ʾ ʿ *ḏ g d ġ*(b?) *ṯ z ḏ y ṯ ṣ*/*ẓ*'. Others suggested a slightly different sequence: '*h l ḥ m q w š r b t s k n ẖ ṣ ś f* ʾ ʿ *ḏ g d ġ ṯ z ḏ y ṯ ẓ*' (Irvine and Beeston 1988).

In 1988, a tablet bearing a *h-l-ḥ-m* sequence was also discovered in Ugarit (RS 88.2215). The transliteration of the text is: '*h l ḥ m q w ṯ r b t ḏ š k n ẖ ṣ s p* ʾ ʿ *ḏ g d ġ ṯ z y*' (Bordreuil and Pardee 1995). Bordreuil and Pardee used this tablet to complete the

Beth-Shemesh inscription, believing that the latter presented an almost similar sequence of letters (Hayajneh and Tropper 1997).

Dietrich and Loretz (1988: 276–293) created a detailed facsimile of the Beth-Shemesh inscription based on photographs in which they suggest that the text contains 28 characters of the *h-l-ḥ-m* sequence. They read it from left to right: '*h l ḥ m q w š r t s k n ḫ b* [ś] *f* ʾ ʿ *ẓ g d ǵ ṭ z ḏ y ṯ ṣ*'.

Later, Puech (1991) published a revised edition of the text based on studies that compare the Beth-Shemesh inscription to the *h-l-ḥ-m* type sequence: '*h l ḥ m q w š r* <b> *t s*^{1} *k n ḫ* [s^{3} p] ʾ ʿ *ḍ g d ǵ ṭ* <z> *ḏ*(?) <y> (ṯ) *ẓ*/*ṣ*(?) *ẓ*(?)'. Sass (1991), having re-examined the tablet, agrees that the first eight or nine characters of the inscription belong to the *h-l-ḥ-m* sequence, but asserts that the rest cannot be determined. He believes that the texts contain only 21–24 characters and reads: '*h l ḥ m q w š r t*/ʿ *h* [...] *ṭ*(?) *d*'.

Below is a summary of the transliteration of the text in the studies presented thus far:

Barton 1933	1. ʾ*el ḫt qb*(?)*t rty qt*(?)*mt*(?). 2. *t* ʿ*ṣ*(?) *g*(?)*l mḥt*
Albright 1964	*hl ḫtq Kṭrt hqn*y [ʾa*tt*(?)] d*t* w(?)*dm mt* [l]*h*
Puech 1986	*h l ḥ m*(?) *q s t š r t h t n y* [r] *q*(?)/ʿ(?) *m*(?) ʿ/*g d m ṭ z p t*/*m*(?)
Loundine 1987	*h l ḥ m q w š r t k n s*(?) [f] ʾ(?) ʿ *ḍ*(?) *g d*(?) *ṭ z*(?) [y ṣ]
Deitrich and Loretz 1988	*h l ḥ m q w š r t s k n ḫ b* [ś] *f* ʾ ʿ *ẓ g d ǵ ṭ z ḏ y ṯ ṣ*
Puech 1991	*h l ḥ m q w š r* <b> *t s*^{1} *k n ḫ* [s^{3} p] ʾ ʿ *ḍ g d ǵ ṭ* <z> *ḏ*(?) <y> (ṯ) *ẓ*/*ṣ*(?) *ẓ*(?)
Sass 1991	*H l ḥ m q w š r t*/ʿ *h* […] *ṭ*(?) *d*

Analysis

Reverse

A small fingerprint (about 9×16 mm) appears on the back of the tablet. A comparison of its size with contemporary statistical data of average fingerprint sizes suggests that a child moulded or handled this tablet (Wu 2018).

Obverse

In the following analysis of the text, we refer to the numbers that appear in Fig. 5. Each number represents a section of the tablet or a character:

Nos. 1–3: There is no room to doubt the identification of the first three letters: *h l ḥ*. The letters *h* (𐤄) and *l* (𐤋) (nos. 1–2) resemble the cuneiform alphabet in Ugarit and other places. The letter *ḥ* (no. 3) can be identified by its resemblance to the Ugaritic script, 𐎅, South Arabian, 𐩦, and even more to modern Geʿez, ሐ.

Nos. 4 and 18: The spot next to no. 4 was damaged during the first year after the discovery of the tablet. A close look reveals a horizontal wedge (Fig. 6), supported by the image published by Grant in 1933. Below the right side of the wedge is a vertical wedge. According to Puech's facsimile (1986: 202), the wedge points down (𒌨), whereas it points up (𒀸) in Dietrich and Loretz's facsimile. Both Sass's and Albright's facsimiles show only the damage in that spot. The wedge seems to point downward, so that the full character is

probably 𐎍. According to the *h-l-ḥ-m* sequence, one would expect this letter to be *m*, but it appears slightly different than the known *m* from the Ugaritic text (from left to right): 𐎌, where the vertical wedge appears after the horizontal one and not before it.

In the case of no. 18, a small fracture occurs above the sign, and a comparison of our observations with Grant's photo suggests that nothing was written on it. The character is probably 𐎍, which can be identified with the Ugaritic *m* (Albright 1964: 52; Puech 1986: 207). However, following Loundine's proposition, this identification was abandoned in favour of its interpretation as a letter in the *h-l-ḥ-m* sequence. Puech (1991) identified character no. 18 as the letter *ġ*, and so did Bordreuil and Pardee (1995), when they completed the inscription of Beth-Shemesh based on RS 88.2215. Nevertheless, the epigraphic evidence does not support this. The character has only two wedges and does not resemble the Ugaritic *ġ*. Since no. 18 is the more common form of *m* known from Ugarit, it appears that the first *m* (no. 4; see also Fig. 6) was poorly written and later corrected. A correction of writing such as this, along with the child's fingerprint on the reverse, raises the possibility that this tablet is a scribal exercise, as, indeed, has been suggested by others (Ryckmans 1988: 126; *KTU* 3).

Nos. 5–9: There is a consensus regarding the letter *q* (𐎒) in character no. 5. According to the *h-l-ḥ-m* sequence, no. 6 should be the letter *w*. Indeed, the character's overall shape resembles Ugaritic *w* (𐎅), but with the middle wedge slightly higher than usual. A small round pit appears in the middle of the character. This probably represents the letters *š* and/or *ṯ*, which can be found in the short version of alphabetical cuneiform (cf. *KTU* 1.77; 4.31; 4.710; 7.60), and it appears again after the letter *w* (no. 7). A close examination shows that the 'pit' was imprinted over the letter *w*, as the clay is pushed aside and distorts the wedges of the character. It seems as if the unskilled scribe wrote the letter *w* in its proper place, then corrected himself by writing the letter *š* over it, believing that he had made a mistake in the sequence, but then corrected himself again and wrote it after the letter *w*. Again, this sort of trial and error is suggestive of a student-teacher interaction. Character no. 8 resembles the Ugaritic *r* (𐎗), and character no. 9 is a long horizontal wedge (𐎁), which most identify with the letter *t*, as in Ugaritic.

Fig. 6: Photomicrograph of no. 4 and surroundings (photo by J. Yogev)

Fig. 7: Photomicrograph of no. 10 and surroundings (photo by J. Yogev)

Nos. 10–11: Comparing character no. 10 with no. 1 suggests that it is the letter *h* (𒄩), as, indeed, was also noted by Albright (1964: 52), Puech (1986: 207) and Sass (1991: 326). Bordreuil and Pardee (1995: 857) read character no. 10 as the letter *š*, as it appears in RS 88.2215:2, where it is written at a 90º angle, with resemblance to its appearance in South Semitic text. We prefer reading *h* over *š*, since, like character no. 1, the tips of the narrow part of the wedges do not touch one another (Fig. 7). We believe that the *h-l-ḥ-m* sequence ends with character no. 8 or 9 in this inscription. Character no. 11 resembles no. 9 and appears as the letter *t* (𒋾). Albright suggested the letter *q* (𒆳), but the wedge is separated and stands independently.

Nos. 12–13: Above character no. 12, a small dent appears, resulting from a fracture and not made by a stylus. The character seems to be composed of three consecutive wedges written diagonally along the end of the object—so that the letter might be *n* (𒉈) or *ẖ* (𒄭). The writing direction leans toward *n*, but since this is a very inexperienced scribe, this cannot be determined with certainty. It is also possible that the sequence of wedges might be a combination of *ʾa* (𒀀) and *t* (𒋾) or some other possible variation. Character no. 13 is only partially visible, where two vertical wedges appear one on top of the other. The scribe probably turned the tablet at this point. If this text has all the Ugaritic characteristics, it could be anything from *ẖ* (𒄭), *z* (𒍝), *y* (𒅈) or a distorted form of a different letter.

Nos. 14–16: From this point onward the text was written at a 180º angle to characters nos. 1–11. The section of nos. 14–16 is either worn or otherwise unintelligible. After calculating the average width of the visible and complete letters in the inscription, it seems that about seven letters could fit in this section. We can identify the tip of a horizontal wedge and then another (no. 15), written against the direction of the other letters. Dietrich and Loretz restored the letter *p* before no. 15 and restored no. 15 as the letter *ʾa*, on the basis of the *h-l-ḥ-m* sequence, but this is not based upon sufficient evidence. The section marked as no. 16 is wide enough for two or three letters. The only clear part shows two partial diagonal wedges. One of them may be part of a *ġ* (𒌷), or *ḏ* (𒂗), known from the Ugaritic script.

Nos. 17–21: Character no. 17 is undoubtedly the letter *d*. It also has a distinctive appearance, in which the lower and upper wedges point at one another (𒁕) instead of the familiar Ugaritic form (𒅗), where the lower wedges turn sideways. This form appears in several texts from Ugarit and outside it, already mentioned here (*KTU* 4.31; 4.710; 6.1; TT 433 and more; Puech 1986: 204). Character no. 18 was discussed above with regard to character no. 4. Character no. 19 is composed of three wedges, which are quite clear (𒌷). It could be an error or a distorted form of *ġ*, *m*, or *ṯ*, but alternatively, might be a form of a different letter in this specific script. Character no. 20 is a long horizontal wedge, which may be the letter *t*, *q*, or part of a separate letter. At this point (no. 21), the tablet is completely worn, which can also be clearly seen in Grant's 1933 photo. Puech (1986: 202) draws the tip of a wedge over no. 21, which is merely a dent in the clay.

After a thorough examination, we may conclude that the first part of the inscription belongs to the *h-l-ḥ-m* sequence: *h l ḥ m q w š r*. It is also possible that the ninth character, *t*, belongs to the same sequence and that the scribe skipped the ninth proper character in the sequel (*b*/*ġ*). There are at least three apparent repetitions of letters: *h* in characters

nos. 1 and 10; *m* in characters nos. 4 and 18; and *t* in characters nos. 9 and 11. This proves that the inscription cannot represent a complete alphabetical sequence. The item may have been a scribal exercise, as suggested by its amateurish preparation: the child's fingerprint on the reverse and the corrected mistakes in characters nos. 4 and 18 and nos. 6 and 7, as well as the use of an available mould unsuitable for a tablet. This suggests that the characters after character no. 9 might be random letters, used as an exercise, or even complete words. We can rely mainly upon the Ugaritic script for the interpretation of this inscription, but considering this tablet solely from an Ugaritic perspective might be detrimental to its decipherment. To conclude this analysis, the Beth-Shemesh inscription includes 24–26 characters and reads:

h l ḥ m q w š r t h t ḫ/n ḫ/z/y(?) […] ʿ […] *d m ġ/m/ṯ*(?) *t/q*(?).

Conclusions

The Beth-Shemesh inscription is at the centre of a heated discussion regarding the formation of the alphabet and the writing systems in the ancient Near East. The purpose here is to provide analytical data to highlight additional aspects that will support further epigraphic and palaeographic interpretations.

After a thorough examination, we may conclude that the item's amateurish preparation and local origin are suggestive of a scribal exercise. The use of an available mould that was not suitable for a tablet, the child's fingerprint on the reverse and the corrected mistakes in the script all point to an inexperienced scribe.

This conclusion brings to mind another alphabetic cuneiform text for which material analyses suggested a local Southern Levantine origin: the so-called Ugaritic letter from Tel Aphek (Goren *et al.* 2007; Naʾaman and Goren 2009: 447–449). The petrographic analysis of the Tel Aphek tablet reveals the use of soil local to the Aphek region or similar environments in the Southern Levant. The minerals lack any sign of change due to heating, indicating that this tablet was made locally and was never fired. Thus, it is either a copy of an original Ugaritic letter deposited in another place or a literary composition that imitates authentic Ugaritic letters. In light of the many exceptional traits noted above, the letter is assumed to be a literary output based upon various original elements that the scribe borrowed from the reality of his time. Such model letters intended to teach young scribes and serve for future correspondence are known from Egypt, particularly from the Ramesside period of the Nineteenth–Twentieth Dynasties (Naʾaman and Goren 2009: 449, with earlier literature).

This school text makes the reading even more problematic since we need to determine whether the unique shapes of some letters are scribal errors or represent the proper form of a letter. This tablet is the only evidence of a school text of the cuneiform alphabet outside Ugarit. The other two inscriptions found in modern-day Israel may represent a local Canaanite dialect and writing system of that region and are a valuable component in discussing the birthplace of the alphabet in the ancient Near East.

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The authors report that there are no competing interests to declare.

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