

# A Translation of the Arkalochori Axe and the Malia Altar Stone

PETER Z. REVESZ

Department of Computer Science and Engineering  
University of Nebraska-Lincoln  
Lincoln, NE 68588-0115  
USA  
revesz@cse.unl.edu, <http://cse.unl.edu/~revesz/>

**Abstract:** - This paper presents a translation of the Arkalochori Axe and the Malia Altar Stone inscriptions, which are some of the longest known Cretan Hieroglyph inscriptions together with the Phaistos Disk. The translations are checked using two consistency criteria. First, a synoptic transliteration is used that aligns symbols from several scripts that are evolutionarily related. When the phonetic values of the different cognate scripts match, then the synoptic transliteration strengthens the reliability of the derived phonetic values. Second, the translations of the Arkalochori Axe, the Malia Altar Stone and the Phaistos Disk inscriptions are also shown to be consistent.

**Key-Words:** - computational linguistics, decipherment, hieroglyph, inscription, script family, translation, transliteration

## 1 Introduction

A convincing decipherment of Cretan Hieroglyphs [13, 14, 25], the Minoan writing system that existed c. 2100 – 1700 BC, requires a consistent translation of all known Cretan Hieroglyph inscriptions not just the translation of single examples. In this paper, we give a consistent translation of three Cretan Hieroglyph inscriptions, namely the Arkalochori Axe, the Malia Altar Stone, and the Phaistos Disk inscriptions.

The Arkalochori Axe is a votive offering that was found in 1934 by Spyridon Marinatos in a Minoan sacred cave near the modern town of Arkalochori in central Crete. The Arkalochori Axe contains a Cretan Hieroglyph inscription (see Fig. 1) with a length of fifteen symbols.

The Malia Altar Stone, which was found by a farmer in 1937, is a blue limestone slab with a cuplike cavity on its top and a Cretan Hieroglyph inscription consisting of sixteen symbols on its side as described by Chapouthier [7]. The Malia Altar Stone is thought to be an offering table with some liquid placed in its cuplike cavity. The exact date of the Malia Altar Stone cannot be determined, but it is considered to be a Minoan artifact. Olivier et al. [14] list the Malia Altar Stone as item number 328 in the Corpus Hieroglyphicarum Inscriptionum Cretae (CHIC).

The Phaistos Disk (also spelled Phaistos Disc), a fired-clay flat round object with an archaic form of writing, was discovered at the Phaistos palace by

the Italian archeologist Luigi Pernier in 1908. It is considered the longest Cretan Hieroglyph inscription.

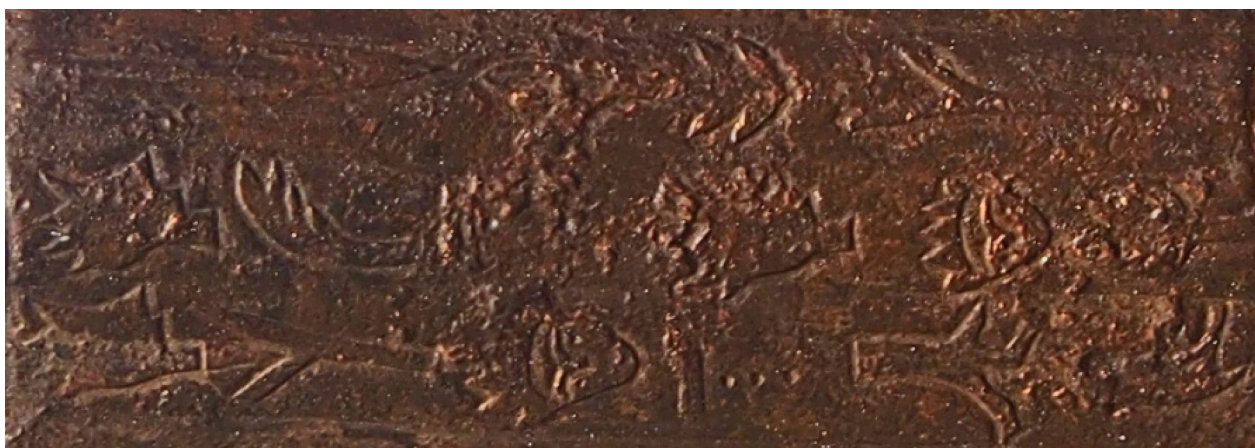
This paper is organized as follows. Section 2 describes previous attempts at translating these three inscriptions. Section 3 describes our translation method. Section 4 presents a translation of the Arkalochori inscription. Section 5 presents a translation of the Malia Altar Stone inscription. Finally, Section 6 gives some conclusions and directions for future work.

## 2 Previous Translation Work

In this section we review some previous translation attempts of Minoan inscriptions.

### 2.1 Phaistos Disk

Many authors noted some visual relationships between the Cretan Hieroglyph script symbols and the Linear A, the Linear B and the Anatolian Hieroglyph script symbols. The common assumption was that the known sound values of Linear B and Anatolian Hieroglyph script symbols could be projected back to similar-looking Cretan Hieroglyph and Linear A script symbols. So far these attempts, some of which are reviewed in Duhoux [8], were not successful in deciphering the Phaistos Disk.



**Fig. 1.** The Arkalochori Axe inscription. This detail is from showing the Wikipedia webpage “Arkalochori Axe” ([https://en.wikipedia.org/wiki/Arkalochori\\_Axe](https://en.wikipedia.org/wiki/Arkalochori_Axe)).

Revesz [20] introduced a new approach to the translation by applying bioinformatics phylogenetic algorithms, to analyze the evolutionary relationships within the Cretan script family, which included in his study the following scripts: Cretan Hieroglyph, Linear A, Linear B [6], Cypriot, Greek, Phoenician, South Arabic, Old Hungarian [9, 10], which is also called *rovásírás* in Hungarian and also written sometimes as *Rovas* in English language publications, and Tifinagh.

Since the bioinformatics phylogenetic algorithms suggested a close evolutionary relationship between the Cretan Hieroglyph (including the Phaistos Disk) script and the Cypriot syllabary and the Old Hungarian scripts, Revesz [20] conjectured that the similar symbols in these scripts are not only cognate but also have similar phonetic values. By further conjecturing that the Minoan language falls within the Finno-Ugric language family, Revesz [18] gave a translation of the Phaistos Disk using Proto-Finno-Ugric and Proto-Hungarian vocabularies and grammars as shown in Fig. 2.

In Fig. 2 each row of the Phaistos Disk text is transliterated into standard Cretan Hieroglyphs then its phonetic value, and finally a Proto-Hungarian translation is presented where the root words are indicated in red and the conjugations are indicated in blue. The shaded areas contain repeated texts, whose translations, which would be repetitions, are omitted.

In addition, Revesz [19] translated some short Cretan Hieroglyph inscriptions that parallel the Phaistos Disk text.

## 2.2 The Arkalochori Axe and the Malia Altar Stone

Using a specific projection of Linear B phonetic

values to Cretan Hieroglyphs, Boutsikos translated both the Phaistos Disk and the Malia Altar Stone as an ancient Greek writing [3]. In particular, for the Malia Altar Stone, he obtained the following translation: “*Cares for trust and quantity goddess Mene path you correct.*”

Using a combination of projections from Anatolian Hieroglyph script phonetic values and Linear B script phonetic values, Best and Woudhuizen [23] translated the Malia altar stone as a Luwian document with the following meaning: “*This inscribed altar stone for Baluzitis, delivery: Skheria.*”

Lia Rietveld in [1], pages 94-95, used a similar projection from Anatolian Hieroglyphs to translate the Phaistos Disk as a Luwian letter written to King Nestor of Pylos. Further extending this approach with some phonetic projections from Egyptian Hieroglyph, Woudhuizen [23] translated several other Cretan Hieroglyph texts, including the Arkalochori Axe inscription as a Luwian text. The approaches of Boutsikos and of Woudhuizen and his co-workers are noted here as some of the more serious translation attempts because they consider several Cretan Hieroglyph texts.

## 3 The Translation Method

Our translation is necessarily based on some assumptions about the Cretan Hieroglyph writing system. Foremost, we need a classification of the Cretan Hieroglyph writing system.

In general, writing systems can be divided into pictographic, syllabic and alphabetic system as shown in Fig. 3. In pictographic writing systems, each symbol denotes a single word. Pictographic writing systems are limited in vocabulary and cannot express grammatical features.

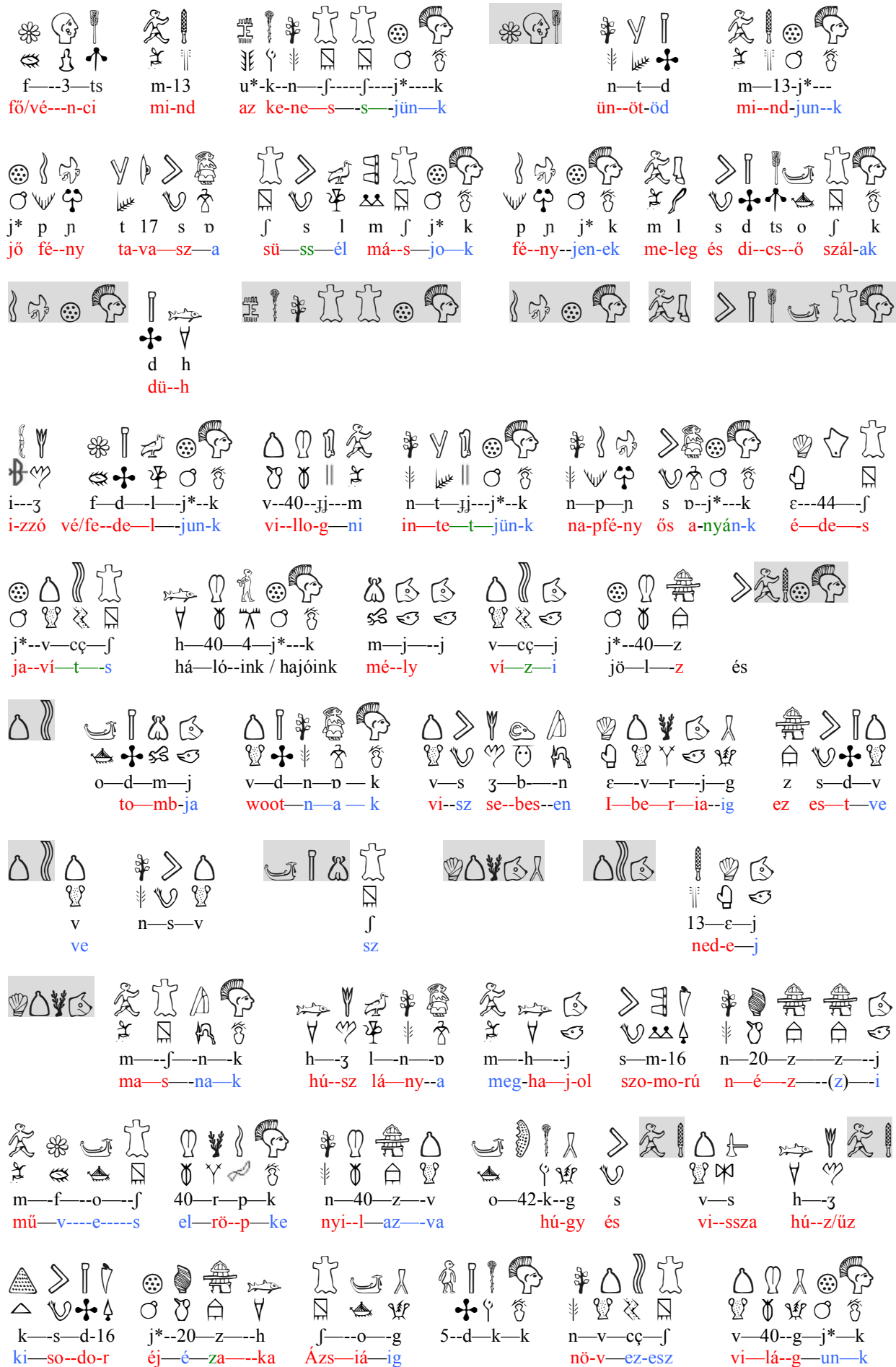
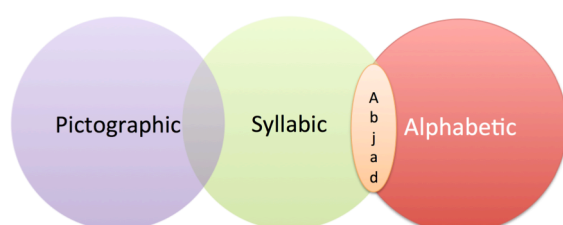


Fig. 2. The Phaistos Disk translation of Revesz [18] with minor modifications.

In syllabic writing systems, each symbol denotes a single syllable. For example, Linear B is a syllabic writing system where in general each syllable begins with a single consonant C, which is followed by a single vowel V to form simple CV-type syllable. Such a syllabic writing is conveniently represented in a syllabic grid, where each row stands for a consonant and each column stands for a vowel.



**Fig. 3.** A classification of writing systems.

In alphabetic writing systems, each symbol represents a single sound. In abjad writing systems each symbol represents a consonant, but when the text is read the vowels that implicitly lie between the consonants are pronounced together with those consonants. Arabic and Hebrew are examples of abjad writing systems, although they also use occasionally some symbols that represent vowels to avoid potential ambiguities. Abjad writing systems can be thought of as the intersection of syllabic and alphabetic writing systems because they share some features with both of those writing systems.

Old Hungarian [9, 10] can be characterized as a partial-abjad script because most of the time only the consonants are explicitly written down while the vowels are only implicit. However, Old Hungarian has more number of vowels than Arabic or Hebrew have. Hence in Old Hungarian the chance of ambiguity is always higher if in a word a vowel is omitted. On the other hand, Old Hungarian inscriptions take advantage of vowel harmony within words. In languages with vowel harmony, each word contains only all high or deep vowels and in fact frequently all the vowels are the same. Hence it is enough to indicate only the first vowel and omit the rest of the vowels. Table 1 illustrates the various writing systems.

What is the type of the Minoan writing system? Most experts say that writing developed from some initial pictogram writing, to syllabic writing, then partial-abjad writing, then abjad writing and finally an alphabetic writing. Most experts also agree that the Minoan writing seems more complex than pictograms and is not an alphabetic writing. It is therefore usually assumed that the Minoan writing is syllabic. Linear B is syllabic and it would seem impossible to that Linear A is a partial-abjad or an

abjad, when Linear B is a later development of Linear A and Cretan Hieroglyphs. However, we would like to propose that the Minoan writing system is a partial-abjad. As writing advances from pictograms, the next stage could be either syllabic—in case there is no vowel harmony and a larger set of vowels in the underlying language—or a partial-abjad—in case there is vowel harmony or only a few vowels. The rational of this hypothesis is that with either vowel harmony or with few vowels, the implicit vowels become easily guessable hence a partial-abjad or abjad writing can be efficiently applied. We believe that the Minoan language had either vowel harmony or few vowels and could naturally develop into a partial-abjad. In contrast, Mycenaean Greek had a larger number of vowels and lacked vowel harmony. Hence Mycenaean Greek naturally developed into a syllabic writing.

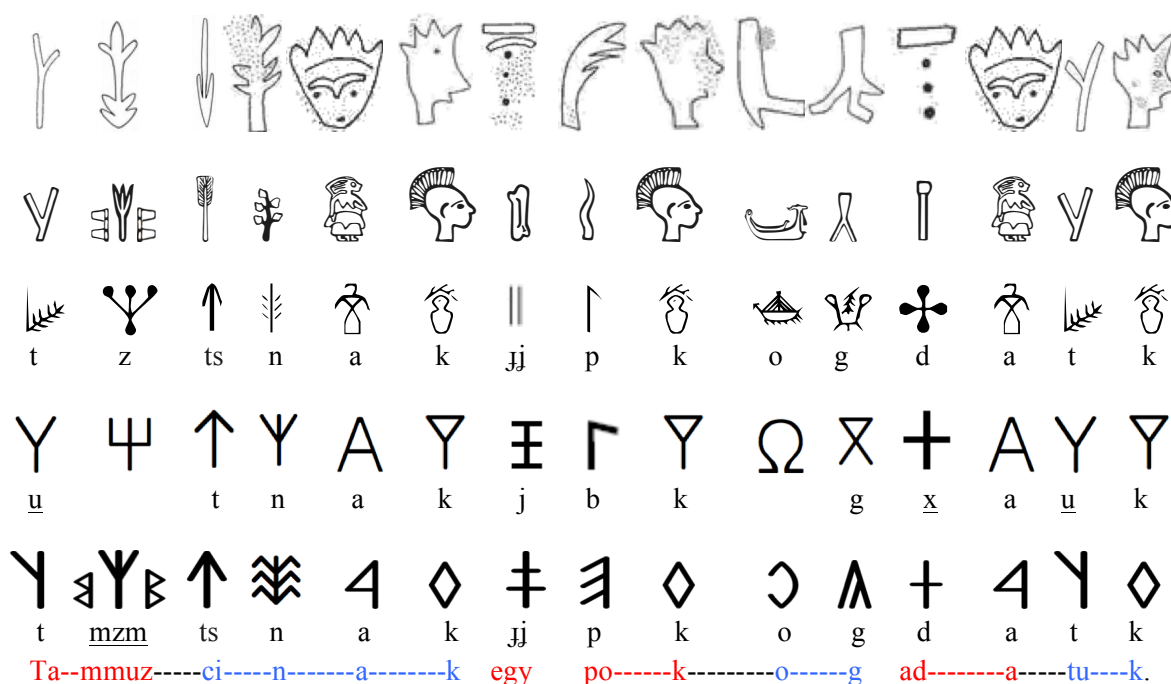
**Table 1.** Different types of writing systems.

Type	Writing “Knossos”	Writing System Examples
Syllabic	Ko-no-so	Linear B
Partial Abjad	K-n-o-s-s-s	Old Hungarian
Abjad	K-n-s-s-s	Arabic, Hebrew
Alphabetic	K-n-o-s-s-o-s	English, Latin

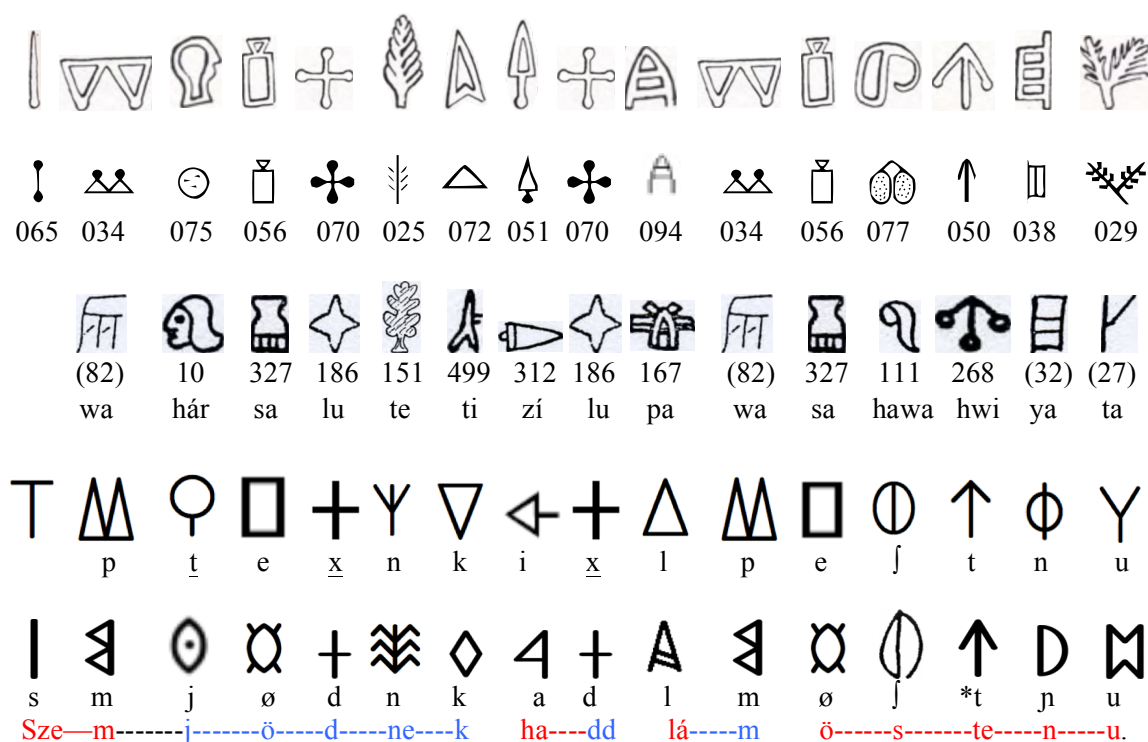
Our translation method uses the following steps. First, we use what we call synoptic transliteration to identify the phonetic values of all the symbols. Synoptic transliteration means that we compare each symbol with several different cognate symbols from other alphabets and syllabaries. Although individual symbols may change their phonetic values, when the phonetic values agree, then it is highly probable that the phonetic value of the Malia Altar Stone symbol was the same as the phonetic value of its cognate symbols. In case of disagreements, we consider which phonetic value may be the original.

Second, we fill in the missing vowels as is required by a partial abjad writing system. The main guide here is that with the additions, we obtain meaningful text in the Proto-Finno-Ugric, Proto-Ugric and Proto-Hungarian languages, which were also used to aid in the translation of the Phaistos Disk [17, 18], under the assumption that the Minoan language could be classified to also belong to the Finno-Ugric group of languages. The fill-in process was partially automated by the use of a database of proto-words from Zaicz [26].





**Fig. 4.** The reading of the Arkalochori Axe inscription (first row) and its transliteration into Phaistos Disk symbols (second row), Cretan Hieroglyph symbols (third row), the Carian alphabet (fourth row) and the Old Hungarian alphabet (fifth row). The IPA sound values are indicated below each Cretan Hieroglyph, Carian and Old Hungarian symbol. In the bottom the translation is shown with root words in red and suffixes in blue.







**Fig. 5.** The Malia Altar Stone inscription (first row), its transliteration into Cretan Hieroglyphs (second row), Anatolian/Luwian Hieroglyphs (third row), the Carian alphabet (fourth row) and the Old Hungarian alphabet (fifth row). The syllabic values are indicated below the Anatolian (Luwian) symbols, and the IPA sound values are indicated below each Carian and the Old Hungarian letter. In the bottom the translation is shown with root words in red and suffixes in blue.

#### 4 The Arkalochori Axe Translation

The Arkalochori Axe contains a Cretan Hieroglyph inscription (see Fig. 1) with a length of fifteen symbols. The first row of Fig. 4 shows the inscription when the symbols in Fig. 1 are read right to left from top row to bottom row.


Some of the symbols bear a striking resemblance to the symbols of the Phaistos Disk. The Arkalochori Axe inscription can be transliterated as a Phaistos Disk inscription and as a Cretan Hieroglyph inscription as shown in the second and third rows of Fig. 4. The Cretan Hieroglyph transliteration uses the standardized Cretan Hieroglyph symbols presented by Olivier et al. [Olivier 1996]. Finally, the fourth and fifth rows of Fig. 4 show the transliterations into the Carian and the Old Hungarian alphabets.

Each transliteration is a simple one-to-one correspondence except in the case of the second symbol. The top of the second symbol seems like the lily symbol in the Phaistos Disk and the standardized Cretan Hieroglyph symbol set. However, the bottom of the second symbol of the Arkalochori Axe shows some roots, while the other two symbols show only a stem. Hence the roots may correspond to two copies of the Phaistos Disk , the Cretan Hieroglyph , the Carian , or the Old Hungarian  symbols with some rotation. Hence the second symbol of the Arkalochori Axe inscription is a ligature of three different symbols. The second and the fifth rows show the decomposition of the ligature into its components. In a ligature, the individual symbols can be read in any order.

The transliterations generally agree in their IPA sound values except for two Carian letters, which are underlined in Fig. 4. The first dissonant Carian letter is  $\Upsilon$  and the second is  $\text{†}$ . We believe that these Carian letters originally had sound values /t/ and /d/ like the visually strongly similar Cretan Hieroglyph and Old Hungarian symbols. However, the pronunciation of these Carian letters later shifted to /u/ and /x/, respectively, due to the influence of the visually similar Greek  $\Upsilon$  and  $\chi$  letters. Hence we took the Old Hungarian sound values, which match the assumed Cretan Hieroglyph sound values, as the basis of our translation attempt.

Our translation, shown at the bottom of Fig. 4, adds the implicit vowels to obtain the Proto-Hungarian text “*Tammuz-ci-nak egy pokog adatuk*,” which means in English “*To Tammuz god this axe we gave.*”

The above translation makes sense in a historical and archaeological context. Since the axe is apparently a votive offering, it makes sense to dedicate it to some god. The god's name seems to be Tammuz, which is the Hebrew name of an ancient Near Eastern food and vegetation deity. According to Joseph Campbell [5] the name of Tammuz derives from the Sumerian Dumuzid and may be the origin of the Greek Demeter.

The third symbol of the Arkalochori Axe inscription corresponds to the Phaistos Disk  symbol, which also occurs at end of some God's name on the Phaistos Disk. Hence this symbol may serve here as a determinative for ‘god.’ The corresponding Old Hungarian letter is pronounced /ts/, which is similar to the first syllable of is-ten (Hungarian for ‘god’). Hence whether the third symbol was actually pronounced while reading or it was only a silent indicator, it seems to remind readers that Tammuz refers to a deity.

The fourth, fifth and sixth symbols of the Arkalochori Axe inscription together read ‘nak,’ which means the preposition ‘to’ in English.

The seventh symbol of the Arkalochori Axe inscription is extended with an implicit vowel to obtain ‘egy,’ which means in English either the indeterminate article ‘a’ or ‘an’ or the numeral ‘one’ and is cognate with ‘ez,’ which means in English the demonstrative pronoun ‘this.’

The eight and ninth symbols of the Arkalochori Axe can be read as ‘pok,’ which seems to be a Proto-Ugric word related to Hungarian ‘fok’ and Khanty ‘pohh’ that both mean ‘eye of a needle.’ We denote this Proto-Ugric root word as \*pok. The Hungarian ‘fokos’ (axe) is a derivative from ‘fok’ using the Hungarian suffix –s. However, instead of –s, the more ancient proto-Ugric suffix is –g was used in the past to create nouns as reflected in the following word pairs:

$\text{fel}^{\text{Hungarian}}$  (up), >  $\text{felleg}^{\text{Hungarian}}$  (n. cloud)

$\text{pol}^{\text{Khanty}}$  (adj. tall) >  $\text{peleg}^{\text{Khanty}}$  (n. cloud)

$\text{ker}^{\text{Khanty, Mansi}}$  (n. bark) >  $\text{kéreg}^{\text{Hungarian}}$  (n. bark)

$\text{valea}^{\text{Finnish}}$  (adj. bright) >  $\text{világ}^{\text{Hungarian}}$  (n. world)

$\text{valea}^{\text{Finnish}}$  (adj. bright) >  $\text{valg}^{\text{Mansi}}$  (v. to shine)

The above examples allow the following hypothetical derivation:


$*\text{pok}^{\text{Proto-Ugric}}$  (eye of a needle) >  $*\text{pokog}^{\text{Minoan}}$  (axe)

The hypothetical derivation shows that \*pokog (axe) could have been easily created from the Proto-Ugric root \*pok (eye of a needle) and the Proto-Ugric suffix -g, which was used to create new nouns. Indeed, the tenth and eleventh symbols of the Arkalochori Axe inscription can be read as the connecting vowel -o and the suffix -g.

The twelfth and thirteenth symbols of the Arkalochori Axe can be read as 'ada,' which seems connected with Finnish 'antaa' (to give) and Hungarian 'adu' (to give), which occurs in some older texts, for example a funeral sermon from 1192 [2] instead of the present day shorter form 'ad' (to give).

Finally, the fourteenth and the fifteenth symbols of the Arkalochori Axe augment the root word 'ada' (to give) with the suffix -tuk, which the first person plural and past tense suffix. Therefore, the entire last word of the inscription is 'ada-tuk' (we gave).

In closing this section, we make some more observations about the symbols used in this translation.






First, the Cretan Hieroglyph symbol  with assumed sound value  $\sqrt{jj}$  is strikingly similar to the Old Hungarian symbol  $\text{'}\sqrt{jj}$  with known sound value  $\sqrt{jj}$  as recorded in a medieval codex from Nikolsburg. That Old Hungarian symbol occurs as a variant of the more common  $\text{'}\sqrt{jj}$  symbol.

Second, the Carian  $\text{'}\sqrt{jj}$  and the Hungarian  $\text{'}\sqrt{jj}$  are closely related both visually and phonetically. The close phonetic similarity is illustrated by the following words:

jeker<sup>Mansi</sup> (root) > gyökér<sup>Hungarian</sup> (root)

jumur<sup>Kipcsak</sup> (stomach) > gyomor<sup>Hungarian</sup> (stomach)

where the Hungarian 'gy' is read as  $\sqrt{jj}$ .

Third, the suffix sequences    and   also occur on the Phaistos Disk. That indicates that these are frequent suffixes and that the reading direction is correct.

## 5 The Malia Altar Stone Translation





Chapouthier [7] assumed a right-to-left reading direction of the Malia altar stone inscription. The top of Fig. 5 shows a reordering of the signs of his drawing to allow a left-to-right reading direction. Several other Cretan Hieroglyph inscriptions have the same sequence of three or two signs. For example, the beginning sequence







of CHIC 118a matches the 4th, 5th, 6th and perhaps also the 7th sign of the Malia altar stone. Similarly, the sequence







occurs within CHIC 49 and 61 followed by a number, which suggests that this pair can denote some commodity. Since the first sign may depict breasts and the second sign some container, the commodity may be bottles of milk. CHIC 178, 238, 244, 248, 260, 281, 295, 296 and 310 also contain the above pair of signs, in each case following the x sign.

The third sign of the Malia altar stone inscription denotes some head. A sheep head followed by a  sign occurs in CHIC 013, 015, 024 and 297, while a cow head followed by a  sign occurs in CHIC 002. In some of these cases, the heads may be logograms indicating sheep milk or cow milk, respectively. However, in the Malia Altar Stone inscription the head sign may denote a human head. A human torso  follows a  sign in CHIC 058.



Finally, like the Malia Altar Stone, CHIC 072 may end with   or it may begin with  . These similarities with the other Cretan Hieroglyph inscriptions indicate a high probability that the reading direction suggested by Chapouthier [7] is correct.

The second row of Fig. 5 shows a transliteration of the Malia Altar Stone into a Cretan Hieroglyph script. The number below each Cretan Hieroglyph symbol is its numbering following Olivier et al. [14].

The third row of Fig. 5 shows a transliteration of the Malia Altar Stone into Anatolian Hieroglyph (or in parentheses Luwian) script. This transliteration as well as the number and syllabic value below each symbol follows the numbering by Woudhuizen [23].

The fourth and fifth rows of Fig. 5 show a transliteration of the Malia Altar Stone into the Carian alphabet [22] and the Old Hungarian alphabet [9, 10], respectively. For the Old Hungarian transliteration, the symbol  is a version of  from the Nagyszentmiklós gold treasure's cup number 23, which is variously dated between the 8th and the 10th centuries (see [10], page 157). Similarly,  is a version of  from the

Constantinople Old Hungarian inscription from 1515 (see [10], page 193).

Table 2 lists the sound values of the Cretan Hieroglyph symbols that are known from previous translations of the Phaistos Disk [18, 19] and augmented with some new values. There is generally a phonetic agreement among the Cretan Hieroglyph, the Carian and the Old Hungarian symbols with only a few exceptions. The exceptions appear in the underlined Carian sound values. We believe that the Carian letters  and  originally had sound values closer to the corresponding Old Hungarian letters and their listed /t/ and /x/ sound values are likely later developments under the influence of the Greek letters for theta  $\theta$  and chi  $\chi$ .

The initial sounds of the Anatolian Hieroglyph syllabic values often differ from the rest of the sound values. Hence our translation is based on the Cretan Hieroglyph symbol and the Old Hungarian sound values because they seem to support each other and appear more reliable than either the Anatolian Hieroglyph or the Carian sound values.
























































































































Our translation is shown at the bottom of Fig. 5. The translation reads “Szem-jödnek hadd lá-m östenu,” after filling in the missing vowels, the word beginning /h/ and the second /d/. Forrai [9] gives examples where word beginning /h/ and doubling of consonants are omitted. The translation means in English “*For your eyes that you may see God.*”

The translation makes sense considering the possible use of the Malia Altar Stone. The cup-like cavity of the Malia Altar Stone was likely filled with some liquid that was sprinkled on the face and eyes of the people as part of some religious ceremony. The people attending the ceremony may have felt that their spiritual eyes were cleansed and afterwards could see God. The liquid could even have had hallucinogenic powers and may have been also drunk by the Minoan faithful.

In the first word of the translation, the root is the Proto-Ugric \*szem (eye). It is followed by an agglutinative suffix, where \*-jeid > -jöd denotes ‘second person possessive case and plural number of objects’ and -nek denotes the preposition ‘for.’ Hence szem-jödnek means ‘for your eyes.’

The expression ‘hadd lám’ means ‘let me see’ or ‘let you see.’ The word ‘hadd’ contains a Proto-Uralic root with cognates Hungarian ‘hagy’ (to let) and Mansi ‘kolj’ (to let) with a second person imperative mood, meaning ‘you let.’ The word ‘lám’ derives from a Proto-Uralic root from which the Proto-Hungarian ‘lát’ (to see) derives.

**Table 2.** Cretan Hieroglyph symbols and their IPA phonetic values.

001		m	041		ʃ	081		
002		m	042		s	082		
003		k	043		s	083		
004		a	044		n	084		
005		f, v	045			085		
006			046		n	086		
007		s	047		j	087		
008		ε	048		i	088		p
009		ε	049			089		ɲ
010		l	050		*t	090		
011		b	051		a	091		
012			052		l	092		ɲ
013			053		é	093		g
014			054		v	094		l
015			055		g	095		
016			056		ø	096		
017			057			Logogram		
018			058			153		l
019		h	059			154		ʒ
020		m	060		p	156		
021			061		k	161		
022			062		d	162		
023		ʒ	063		d	164		
024		r	064			166		
025		n	065		s	168		ɲ
026			066		ʃj	169		
027		t	067		nd	170		
028		p	068		u	171		
029		u	069		çç	172		
030		z	070		d	173		
031		ʒ	071			179		
032		z	072		k	180		
033			073			304		
034		m	074			305		
035			075			308		
036			076			309		
037		z	077		ʃ	1		
038		ɲ	078		k	10		
039			079			100		
040		o	080			1000		



Finally, the word 'östenu' seems cognate with Hungarian 'isten' (god) and Hattian 'istanu' (sungod).

A possible variation of the above translation assumes that the last letter in the Old Hungarian transliteration is  $\aleph$  with a phonetic value /t/. In that case the last word would be isten-t. Since -t is the Hungarian accusative suffix, the meaning of isten-t would be 'to see god-accusative-suffix.'

The precise origin of the Hungarian -t accusative suffix is unknown because it is not shared with Khanty and Mansi but still occurs in some of the earliest extant texts such as a funeral sermon from 1192 [2]. On the other hand, the -t accusative suffix is not applied consistently in the early texts and is often omitted.

Either translation implies a belief in the spiritual power of liquids. That belief recalls Minoan and later Greek libation offerings and several ancient Near Eastern parallels [12]. Libations may have been intended to revivify the dead by some magic power of the offered liquid, which was often blood, wine, oil or milk.

## 6 Conclusions and Future Work

In this paper, we presented a translation of the Arkalochori Axe and the Malia Altar Stone inscriptions. Our translations use a synoptic transliteration into scripts whose phonetic values are at least partially known. After a synoptic transliteration, it is easier to guess the original phonetic values of the symbols in the unknown script. That is similar to how in bioinformatics, the multiple alignment of related genomes can be used to generate a hypothetical genomic sequence of the common ancestor of the aligned genomes [20, 21].

The present translations are consistent with our previous translations of the Phaistos Disk [18] and some shorter Cretan Hieroglyph inscriptions [19]. The consistency is threefold. First, there is a phonetic consistency in that each translation transliterates cognate symbols into the same or similar phonetic value using Table 2. Second, there is also a language consistency as each of the three translations yields a Proto-Finno-Ugric or more precisely a Proto-Ugric or even a Proto-Hungarian text. Third, each of the three translations is a religious text, indicating the importance of religion in the Minoan culture, although we can expect some future translations of some other inscriptions to be concerned with accounting like many Linear B texts do.

While the Arkalochori Axe, the Malia Altar

Stone and the Phaistos Disk texts are some of the longest Cretan Hieroglyph inscriptions there are hundreds more Cretan Hieroglyph inscriptions that still need to be translated. We plan to apply our synoptic transliteration method to translate further inscriptions. Hopefully, correct translations of the remaining Cretan Hieroglyph inscriptions will provide historians a greater understanding of the ancient Minoan culture.

## References:

- [1] W. Achterberg, J. Best, K. Enzler, L. Rietveld, and F. Woudhuizen, *The Phaistos Disc: A Luwian Letter to Nestor*, Dutch Archaeological and Historical Society, 2004.
- [2] L. Benkő, *Az Árpád-kor Magyar Nyelvű Szövegei*, Régi Magyar Irodalomtudományi Intézet, 1980.
- [3] S. Boutsikos, *Malia Altar Stone*, Available at: <http://the-phaistos-disk.webnode.com/malia-altar-stone/>, downloaded May 11, 2017.
- [4] G. Brandt et al., Ancient DNA Reveals Key Stages in the Formation of Central European Mitochondrial Genetic Diversity, *Science*, Vol. 342, No. 6155, 2013, pp. 257-261.
- [5] J. Campbell, *Occidental Mythology: The Masks of God*, Viking Penguin, 1962.
- [6] J. Chadwick, *The Decipherment of Linear B*, Cambridge University Press, 1958.
- [7] F. Chapouthier, Inscription Hiéroglyphique Gravée sur un Bloc de Calcaire, *Bulletin de Correspondance Hellénique* Vol. 62, 1938, pp. 104-109.
- [8] Y. Duhoux, How Not to Decipher the Phaistos Disc, *American Journal of Archaeology*, Vol. 104, No. 3, 2000, pp. 597-600.
- [9] S. Forrai, *The Old Hungarian Writing from Ancient Times to the Present*, (in Hungarian), Antológia Kiadó, 1994.
- [10] G. Hosszú, *Heritage of Scribes: The Relation of Rovas Scripts to Eurasian Writing Systems*, Rovas Foundation Hungary, 2013.
- [11] P.C. Kanellakis, G.M. Kuper, P.Z. Revesz, Constraint Query Languages, *Journal of Computer and System Sciences*, Vol. 51, No. 1, 1995, pp. 26-52.
- [12] N. Marinatos, *Minoan Kingship and the Solar Goddess: A Near Eastern Koine*, University of Illinois Press, 2010.
- [13] J.-P. Olivier, Cretan Writing in the Second Millennium B.C., *World Archaeology*, Vol. 17, No. 3, 1986, pp. 377-389.
- [14] J.-P. Olivier, L. Godart and J.-C. Poursat, *Corpus Hieroglyphicarum Inscriptionum Cretae (Études Crétoises 31)*, De Boccard,

- 1996.
- [15] P.Z. Revesz, *Introduction to Databases: From Biological to Spatio-Temporal*, Springer, 2010.
  - [16] P.Z. Revesz, An Algorithm for Constructing Evolutionary Trees Using Common Mutation Matrixes, In: *Proc. 4th ACM International Conference on Bioinformatics and Computational Biology*, ACM Press, 2013, pp. 731-734.
  - [17] P.Z. Revesz, A computational translation of the Phaistos Disk, In: *Mathematical Models and Computational Methods*, Imre J. Rudas, editor, INASE Press, 2015, pp. 53-57.
  - [18] P.Z. Revesz, A Computer-Aided Translation of the Phaistos Disk, *International Journal of Computers*, Vol. 10, No. 1, 2016, pp. 94-100.
  - [19] P.Z. Revesz, A Computer-Aided Translation of the Cretan Hieroglyph Script, *International Journal of Signal Processing*, Vol. 1, No. 1, 2016, pp. 127-133.
  - [20] P.Z. Revesz, Bioinformatics evolutionary tree algorithms reveal the history of the Cretan script family, *International Journal of Applied Mathematics and Informatics*, Vol. 10, No. 1, 2016, pp. 67-76.
  - [21] M. Shortridge, T. Triplet, P.Z. Revesz, M. Griep, R. Powers, *Computational Biology and Chemistry*, Vol. 35, No. 1, 2011, pp. 24-33.
  - [22] Wikipedia, "Carian alphabets," downloaded April 5, 2017. Available: [https://en.wikipedia.org/wiki/Carian\\_alphabets](https://en.wikipedia.org/wiki/Carian_alphabets)
  - [23] F. Woudhuizen, *The Earliest Cretan Scripts*, Innsbrucker Beiträge zur Kulturwissenschaft, 2006.
  - [24] J. G. Younger, The Cretan Hieroglyph Script: A Review Article, *Minos* Vol. 31-32, 1996-1997, pp. 379-400.
  - [25] P. Yule, *Early Cretan Seals: A Study of Chronology*, Marburger Studien zur Vor und Frühgeschichte, 1981.
  - [26] G. Zaicz, chief editor, *Etimológiai Szótár: Magyar Szavak és Toldalékok Eredete, (Etymological Dictionary: Origin of Hungarian Words and Affixes)*, Tinta Könyvkiadó, 2006.