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A Study of T670 and Two Lexical Determinatives in Mayan Writing

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Introduction

This paper has as its main goal to contribute to ongoing research on semantic determinatives (e.g. Hopkins 1994; Hopkins and Josserand 1999; Mora-Marín 2008). More specifically, the paper identifies two sets of semantic determinatives which, when applied to T670 or MZD > MA1(c)/MA3 (Figs. 1a-b), yield distinct lexical values.¹ This is not an entirely new realization. Epigraphers seem to know this *intuitively*, as the following statement by Boot (2003:3) reveals: “The logographic value for T670 depends on the hieroglyphic signs affixed to it (see YAL) [...]” Indeed, in the first case (Figs. 1c-d), the combination of T670 with either SPIRAL (Fig. 1c) or T584/XH1 (Figure 1D) yielded the value YAL for *y-aal* ‘her child’ or ?AL(AL) for *?al(-al)* ‘woman’s offspring’. In the second case (Fig. 1e), the combination of T670 with T533/ZA1a, a

¹ This paper utilizes Thompson (1962), Macri and Loooper (2003), Macri and Vail (2009), and Loooper et al. (2022). Whenever Loooper et al. (2022) revise a previous code by Macri and Loooper (2003) and Macri and Vail (2009), I indicate this with the ‘greater than’ sign, as in MZD > MA1/MA2a/MA2c, with the code on the left being the earlier version, and the one on the right the later version. Whenever they have retained the same grapheme code employed in Macri and Loooper (2003), I will simply use that code without commenting on it further. In general, for the older non-Thompsonian codes, I will use the version in Macri and Vail (2009), which combines both Classic and Postclassic graphemes; Macri and Loooper (2003) only provides Classic-period graphemes. When a particular non-Thompsonian code is rendered as multiple versions, e.g. MA1 for which three renderings are provided, I may employ lowercase letters between parentheses to indicate which of the versions I am referring to, e.g. MA1(a) for the first version, MA1(b) for the second, or MA1 (c) for the third.

sign with an established value **ʔAJAW** for *ʔaajaaw ‘lord, ruler’, and likely exhibiting other logographic values, yielded the value **K’AM/CH’AM** for *ch’am* ‘to receive’.

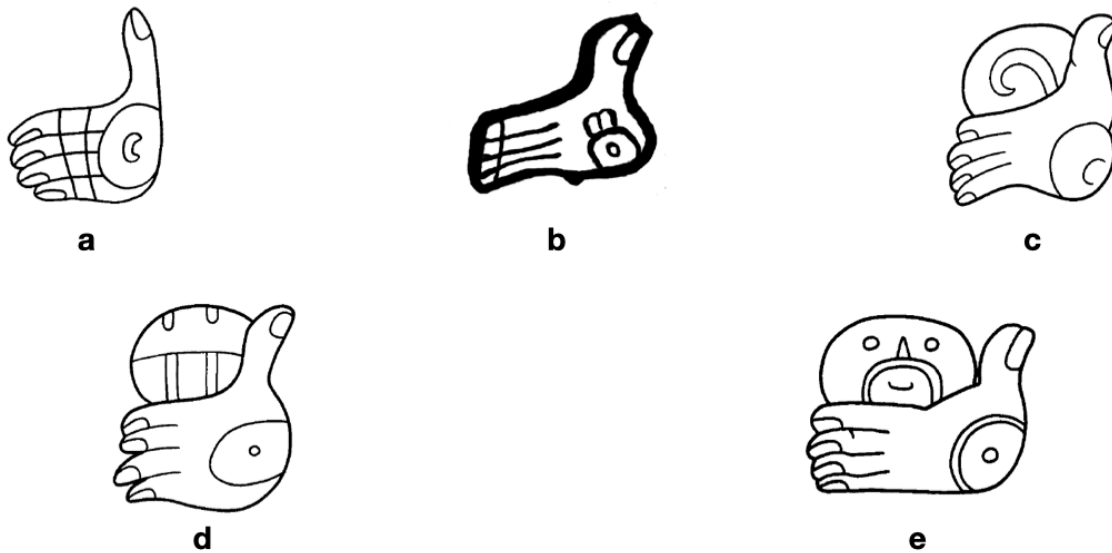


Fig. 1. T670 and the glyphic collocations of interest. **a.** Classic version of T670, MZD > MA1(c). **b.** Postclassic/codical version of T670, MZD > MA1(c)/MA3. **c.** MZE(a)/MZE(d) > MA2a(a-b,f)/MA2b(a-b)/MA2c, **YAL/ʔAL** for *y-aal* ‘her child’. **d.** MZDb/MZEb/MZEe or MA2a(c-e), **YAL/ʔAL** for *y-aal* ‘her child’. **e.** MZDd or MA1(a-b), **CH’AM/K’AM** for *ch’am/k’am* ‘to receive’. All drawings from Macri and Vail (2009:294).

Thus, epigraphers recognize, intuitively, the functions of such “affixed” signs, but we have yet to problematize them. This paper proposes that such signs are functioning as semantic determinatives, perhaps more appropriately termed *lexical determinatives*, as recommended below. The paper also proposes that such determinatives are more commonly used than previously recognized, and that they deserve more study.

With signs shaped like hands, *typically* the combining element was placed above the hand (**Fig. 2a**), a location that is described here as the *holding site*. In the case of T670 or MZD > MA1(c)/MA3, various signs are documented in this holding site: SPIRAL (**Fig. 2b**), to my knowledge uncatalogued; T518b/584 or XH1 (**Fig. 2c**); T533 or AM1 > ZA1a (**Fig. 2d**); and T534 or AMB > ZA2 (**Fig. 2e**). Other signs, not illustrated, may also occur in the holding site for T670, such as T561/XH3 and T544/XQ3.

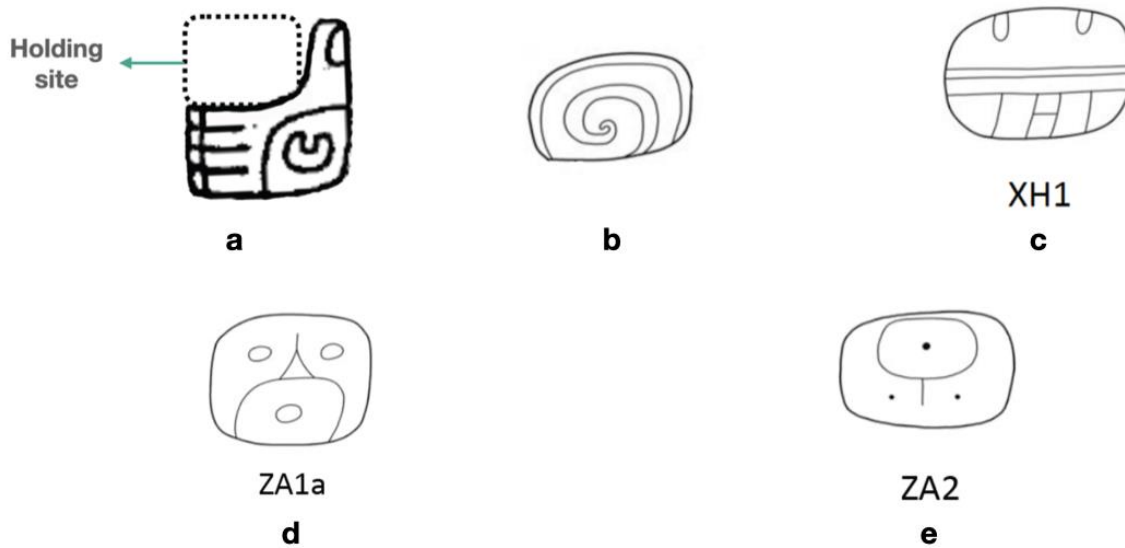


Fig. 2. Holding site for main sign (T670) and secondary signs. **a.** Early Classic version of T670/MA1/MA1a/MA1c (formerly MZD). **b.** Uncataloged SPIRAL sign. **c.** T518b/584/XH1. **d.** T533/ZA1a (formerly AM1). **e.** T534/ZA2 (formerly AMB). Details in a)-b) are from drawing of Tikal Stela 31 by Linda Schele. Drawings in b-e) from Macri andLooper (2003) and Looper et al. (2022).

Determinatives are not read aloud. Instead, they function as specifying the function or value of another sign. More to the point, semantic determinatives function as lexical determinatives, for they are not assisting in conveying a general semantic category, but instead, a specific lexical value (i.e. *y-aal* ‘her child’ or *?al(-al)* ‘woman’s offspring’ vs. *ch’äm/k’am* ‘to receive’).² I thus propose the term *lexical determinative* (or *lexical diacritic*).³ I will transcribe them as uppercase, Roman (non-bold), superscript letters, e.g. ^{SPIRAL}YAL for SPIRAL:T670, ^{T533}CH’AM for T533:670.

Evidence for the logographic values of the expressions involving both T670 and associated secondary signs in holding sites has come from syllabic complements and purely syllabographic spellings, the latter prescinding of the T670 sign and the determinative secondary sign, as seen in **Figs. 3a-b**, where the **ya-la** sequences provide a spelling of *y-aal* ‘her child’. Similarly, evidence for the determinative function of T533 in connection with T670 for the expression **CH’AM/K’AM** comes from examples where T533:670 is followed by the object of the transitive verb (**Fig. 3c**), as well as parallel examples where the same object replaces T533 in the holding site (**Fig. 3d**). Of course, syllabograms functioning as phonetic complements to the logographic value of the expression may substitute for the lexical determinative: this is the case of

² Due to its phonetic value, the logogram YAL for *y-aal* ‘her child’ was also employed as a CVC syllabogram, to spell the near-homophonous *y-al-* sequence of verbs like *y-al-(a)j-Ø-iy(+a)* ‘s/he has (indeed) said it (here)’ and also *ya[h]l-aj-Ø-Ø* ‘s/he/it was thrown; s/he/it fell’.

³ I do not favor “diacritic” because most lexical determinatives are full-blown graphemes (e.g. T533, or the CARTOUCHE sign employed with day signs), rather than minimized graphemes like the duplication diacritic (22A), consisting of two small dots, often joined together.

T534 **la** (Fig. 3e), which may replace the SPIRAL or the T518b/584 determinative. Syllabograms may also occupy the holding site for secondary signs but function to spell (partly or completely) an inflectional or derivational morpheme conveyed by the glyphic collocation: this the case of T1 **ʔu** (Fig. 3f), spelling the proclitic *u-* ‘third person singular ergative/possessive’ marker, and T130 **wa** (Fig. 3g), spelling part of the *-V1w* ‘indicative default/completive status of transitive verbs’ marker. Finally, regarding the case of the expression **YAL** for *y-aal* ‘her child’, in a few cases part of the name/title phrase of the possessor (i.e. the mother) may replace the lexical determinative and occupy the holding site instead: this is evident when one compares a case such as **ya**-^{SPIRAL}**YAL-K’UHUL-ʔIXIK** (Fig. 3h) and **ya-K’UHUL.ʔIXIK-YAL** (Fig. 3i). Thus, syntactic arguments, whether objects of a transitive verb in the case of **CH’AM/K’AM**, or possessors of a noun in the case of **YAL**, could occupy the holding site. That said, the latter situation was rare and geographically restricted, as discussed below.

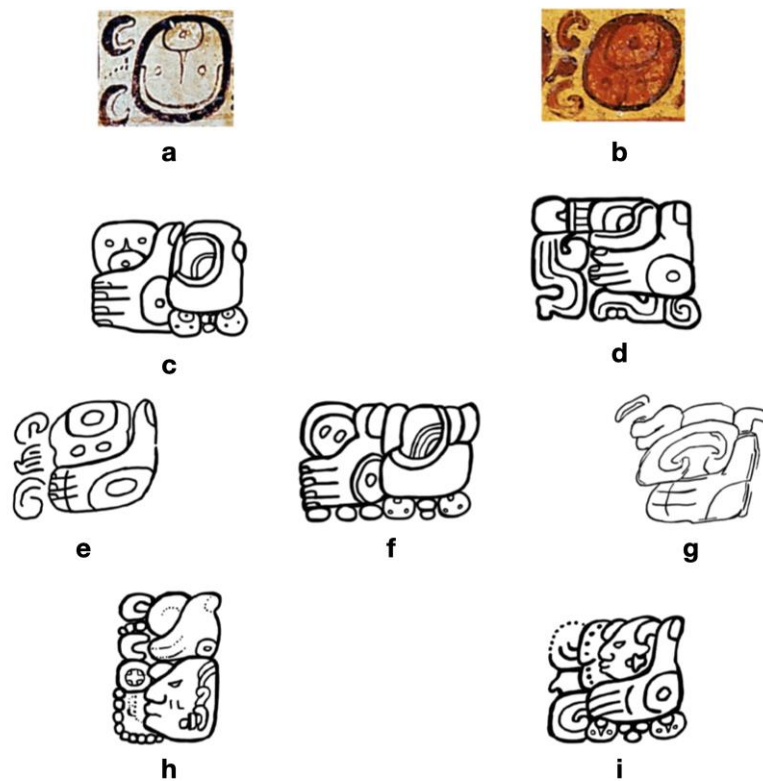


Fig. 3. Omissibility of lexical determinatives. **a.** **ya-la** expression from K635. **b.** **ya-la** expression from K679. **c.** ^{T533}**CH’AM-K’AWIL** on Palenque Temple 14 Tablet. Drawing by the author after drawing by Linda Schele. **d.** **CH’AM-wi-K’AWIL** on Quirigua Monument 6. Drawing by the author after Looer (1995:325–328, fig. 5.2). **e.** **ya-la-YAL** on Caracol Stela 16. Drawing by author after Beetz and Satterthwaite (1981:Fig. 15a,b). **f.** **ʔu-CH’AM-ma-K’AWIL** on Palenque Temple 14 Tablet. Drawing by the author after drawing by Linda Schele. **g.** **ʔu-wa-CH’AM** > **ʔu-CH’AM-wa** on jade plaque fragment from Costa Rica. Drawing by the author. **h.** **ya**-^{SPIRAL}**YAL-K’UHUL-ʔIXIK** on Tonina Monument 138. Drawing by the author after Graham and Mathews (1999:167). **i.** **ya-K’UHUL.ʔIXIK-YAL** on Palenque Tablet of the Foliated Cross B. Drawing by the author after drawing by Linda Schele.



Methods

The present research employs the Maya Hieroglyphic Database (MHD), specifically a beta version of the now published online database (Looper and Macri 2011-2022). The author searched for instances of each expression and then examined the actual glyphic collocations in which the signs in question appeared. The key search terms were the MHD catalog codes from Macri and Looper (2003), Macri and Vail (2009), and Looper et al. (2022), already described (cf. **Figs. 1-2**). Since these catalogs do not usually distinguish logographic graphemes based on presence or absence of a determinative, all that is needed is the general grapheme code for the relevant logographic value, i.e. MA2 for **YAL/?AL** and MA1 for **CH'AM/K'AM**. Approximately 152 Classic-period instances of MA2 and 242 Classic period instances of MA1 were obtained in my search. Unfortunately, at the time of my research, the version of the MHD available to me did not contain image files. Thus, I only studied examples whose graphic composition I could examine easily from a variety of sources (e.g. Justin Kerr's image archive), and which included recognizable secondary signs within the holding site. Any examples whose secondary signs were unclear were excluded. Cases of T670 where a value (as **CH'AM/K'AM**) or even a function (as a transitive verb) is unclear (due to lack of phonetic signs as complement or in substitution), such as the T1016:670 expression (e.g. Tikal Ballcourt Marker, Calakmul Stela 114, etc.), were also excluded.⁴ Particularly close attention was paid to the SPIRAL sign, as well as the signs T518b/584 and T533. Only examples in which the sign within the holding site could be identified have been incorporated in the dataset. The useful dataset comprises 219 instances: 76 of the **YAL** expression and 143 of the **CH'AM/K'AM** expression. I will focus on the patterns of occurrence and co-occurrence of T670 with respect to the signs in the holding site, as well as between the sites in the holding site and signs that may follow the logographic expression. A more thorough evaluation of the problem could be conducted with the new version of the MHD (Looper and Macri 1991-2022), available online at mayadatabase.org.

Results

Table 1 presents the overall results which will be broken down more carefully below. First, it shows that 76.3% of cases of the expression **YAL** involve T670 plus a determinative, consisting of the SPIRAL sign in a majority of cases (43/76), followed by T518b/584 (14/76), and at least one instance of T561 (1/76), specifically at Xcalumkin. In contrast, only 21% of cases of the expression **CH'AM/K'AM** involve the determinative T533. The reason for this discrepancy may lie in the fact that the typical object of the verb *ch'äm/k'am* was simplex and singular, the noun *k'awil* (*k'awil?*), referring to the God K scepter, and that as such, especially in situations where a lot of information had to be packed within a glyph block, it was convenient enough for scribes to simply represent the logogram T1030/SSFa **K'AWIL** in the holding site for T670, which was of course, iconographically speaking, where it belonged. This happened in 76.2% of the cases of **CH'AM** studied here. However, in situations where space allowed it, or where the object of the verb was not simplex, but a more complex noun phrase, scribes would then express such object

⁴ The T1016:670 expression may very well involve a logographic value **CH'AM/K'AM**, given a few instances of the presence of **ma** as a likely phonetic complement; however, as far as I could tell, every single case involves T1016 placed in the holding site. It is possible that T1016 could be cueing yet another value for T670, and that it functions as a lexical determinative in these contexts.



separately, in which case T533, the lexical determinative, would be employed. In contrast, only 6.6% of examples of the **YAL** expression involved a possessor replacing the lexical determinative; moreover, all five examples come from the same site, Palenque. Next, syllabograms could replace the determinative. In the case of the **YAL** expression, the holding site was occupied by syllabograms in 15.8% of the cases, with 14 examples of T534 **la** (cf. **Fig. 3e**) and one of T126 **ya**. With the **CH'AM/K'AM** expression, only two examples in the dataset include syllabograms occupying the holding site for T670, as already seen in **Figs. 3f-g**, one of **ʔu** to represent the third person singular ergative and possessive marker, and another of **wa**, to partially spell the $-V_1w$ 'plain/indicative status root transitive verbs in default/completive aspect' suffix. Finally, there are a very few instances where it seems that a scribe confused T533 and T534, either on purpose, as part of an artistic license, or in error. One such case involved the expression **YAL** with T533 instead of T534; with the case of **CH'AM**, two such cases involved T534 instead of the expected T533.

Table 1. Overall results for T670 according to intended logographic expression.

	YAL		CH'AM	
Determinatives	58	76.3%	30	21.0%
Syntactic arguments	5	6.6%	109	76.2%
Syllabograms	12	15.8%	2	1.4
Errors or scribal play	1	1.3%	2	1.4
	76	100%	143	100%

It should be observed that the majority of the cases in which T1030/SSFa **K'AWIL** occupies the holding site for T670, and in the process replaces the lexical determinative T533, occur in a very specific set of related texts: the Dynastic Vases that describe the dynastic sequence of the Snake Kingdom. The highly formulaic and information-packed nature of these texts may have strongly favored the use of this representation strategy. These vases comprise 84 of the 109 instances in which T1030 occupies the holding site of the **CH'AM/K'AM** expression, and thus, may result in a significant skewing of the normal prevalence of such strategy. As seen in **Table 2**, if the Dynastic Vases were excluded, the use of the lexical determinative, T533, would constitute 50.8% of the cases of the **CH'AM/K'AM** expression, and the use of T1030/SSFa **K'AWIL** in the holding site would amount to 42.4%.

Table 2. Without dynastic vases (84 cases of **CH'AM** with T1030 in holding site).

	YAL		CH'AM	
Determinatives	58	76.3%	30	50.8%
Syntactic arguments	5	6.6%	25	42.4%
Syllabograms	12	15.8%	2	3.4
Errors or scribal play	1	1.3%	2	3.4
	76	100%	59	100%



Implications

From the perspective of orthographic practices, the present proposal calls for some lexical determinatives to be regarded as cases of polyvalent signs: T533 would be not just **?AJAW** (as well as either **MOK** or **B'AK**), but also a lexical determinative in ^{T533}**CH'AM/K'AM**; and similarly, T518b/584 could be not just **B'EN** (day sign), but also a lexical determinative in ^{T584}**YAL**. In other words, in the study of polyvalence, it is useful to think both in terms of lexical, phonetic, and functional values: a single, polyvalent grapheme may exhibit logographic, syllabographic, or determinative values in different contexts.

Many more related questions can and should be addressed using the data available in the MHD. Geographic and temporal patterns should be assessed; variation according to media types (e.g. portable vs. monumental; painted vs. carved) and genres (e.g. dedicatory vs. dynastic history) will likely yield interesting results. It was already noted that portable texts, specifically pottery vessels, and even more specifically the subset of vessels referred to as the Dynastic Vases, comprise most instances in which T1030 is placed in the holding site of T670 in the **CH'AM/K'AM** expression. T533, in contrast, is more widely distributed, temporally, geographically, and in terms of media. With regard to the **YAL** expression, it was already observed that all the cases in which a possessor occupies the holding site are restricted to Palenque and are all in fact contemporaneous. The **SPIRAL** sign in the holding site is the most widely distributed across time, space, and media. A larger dataset should reveal patterns in the spread of certain representational innovations and is worth attempting in the near future.

Discussion and Conclusions

The main objective of this paper was to explore the nature of lexical determinatives (aka semantic determinatives). It has been shown that they are worth investigating in detail, as they add significantly to our knowledge of orthographic conventions (e.g. polyvalence), representational conventions (e.g. composition of logograms, including possible graphic substitutions of their components), and grapheme typology. In the case of the **CH'AM/K'AM** expression, it was shown that T1030 **K'AWIL**, referring to the God K scepter (and presumably the kingly ideals or prerogatives it represents), likely because of its status of the object of the transitive verb, as well as its iconographic association with the T670 sign (i.e. as an object that would be held in the hand), frequently replaced the T533 determinative in the holding site. The question is whether T1030 became, itself, regarded as a determinative, signaled by cases where it is placed in the holding site for T670, with T670 being followed by another sign that represents the object of the transitive verb (perhaps another T1030 itself), indicating that T1030 in the holding site is not meant to be read aloud, but is now a non-phonetic and non-lexical grapheme. If proven to be the case, lexical determinatives could be argued to arise gradually, because of frequent lexical co-occurrence associations.

As it turns out, there may be one such example, brought to my attention by Matthew Looper (personal communication 2022): it is an instance where, apparently, T1030:670:130 **K'AWIL-CH'AM-wa** was followed by T1030 **K'AWIL** (Fig. 4). This example is found on a plate in the Mint Museum, Charlotte 1983.172.33 (Robicsek and Hales 1981:165, Vessel 137). The spelling points to a typical incorporative antipassive phrase, involving an antipassive verb followed by the (loosely) incorporated object, only here, T1030 **K'AWIL** appears in both the holding site of T670 as well as in the following glyph block, where it

represents the incorporated object. Since the holding site may take a lexical determinative, a syllabogram, or a syntactic argument (e.g. object), this could be simply a case where a logogram representing a verb's object is placed in such site. However, since an incorporative antipassive verb is an intransitivized transitive followed by a single, generic, non-specific object, it cannot be a case of a complex nominal expression involving a repetition of *k'awil*. Instead, only one **K'AWIL** was meant to be read aloud, almost certainly the second one occupying its own glyph block. This example, if verified through a detailed examination of the text, would suggest that, for at least one scribe, T1030 was in the process of becoming a lexical determinative of T670's **CH'AM** value.



Fig. 4. Plate, Mint Museum 1983.172.33, detail of text. Collection of the Mint Museum, Charlotte, NC. Gift of Dr. and Mrs. Francis Robicsek. Photo by Matthew Loper

The use of T533 as a determinative may have started out in the same way, through common co-occurrence of a verb with an object: its **?AJAW** value may have involved not only the meaning 'lord, ruler', but also 'sacred object', a meaning reconstructible to proto-Tzeltalan **?äjäw* 'venerated or sacred object' (Kaufman 1972:94). It is possible to imagine a hypothetical phrase 's/he held the sacred object', which, if employed frequently enough, may have led to a strong association between the T670's **CH'AM** value and T533, resulting in its gradual graphemic reanalysis as a determinative of the logographic value **CH'AM/K'AM**.

My next step is to examine the lexical determinatives associated with T713, a polyvalent sign (i.e. **CH'AL/K'AL, K'AB', mi, PAS(AJ)**), and will further explore the theoretical implications of recognizing and studying these determinatives. One of the questions to be examined in connection with T713 pertains to the significance of objects of transitive verbs. I suspect that such a frequency-based association can be



shown to be at play with T713 and its determinatives, specifically when it functioned as the logogram **CH'AL/K'AL** for *k'al* 'to close, wrap, adorn'.

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Appendix 1: Dataset for YAL/?AL prior to culling. Glyphic transcriptions are exactly as present in earlier, beta version of MHD. Objabbr1 (> Objabbr) may be used to locate data in MHD online (mayadatabase.org).

	objabbr1	objclass	objlc	blocklogosyllabic	blgraphcodes	holding site	blsem
1.	AGTSt19	Monument	09.17.07.12.15	ya al wa	32A MA2c 2S2s	SPIRAL	verb
2.	ALCSt01	monument	09.06.07.03.18	ya al	32A MA2a	SPIRAL	child/mother
3.	ALHRP2563	portable object	09.07.11.02.17	ya al la	32A MA2a ZA2	SPIRAL	child/mother
4.	ARPSt02	monument	09.15.00.00.00	ya al la ix ?? ajaw	32A MA2a ZA2 PLBa HB1 ZB1	SPIRAL	child/mother, site title
5.	BPKSt01	monument	09.17.10.00.00	ya al la ix a ku lu	32A MA2a ZA2 PLBa AK2s ZC1s ZR2	T534	child/mother, personal name
6.	CAYAlt04	monument	09.15.00.00.00	ya al	32A MA2a	SPIRAL	child/mother
7.	COLBruPl	portable object	Late Classic	ya al la	32A MA2a ZA2	SPIRAL	child/mother
8.	COLDenvC	portable object	Early Classic	03 al la	003 MA2a ZA2	T584	title?
9.	COLDenvC	portable object	Early Classic	ya al	32A MA2a	SPIRAL	title?
10.	COLDenvC	portable object	Early Classic	a al ja ta	MA2a	T584	title?
11.	COLDOPan1	monument	09.15.15.00.00	ya al	32A MA2a	T584	child/mother
12.	COLFemr	portable object	Late Classic	ya al	32A MA2a	SPIRAL	child/mother
13.	COLJM4441	portable object	09.00.00.00.00	ya al la	32A MA2a ZA2	SPIRAL	child/mother?
14.	COLK0681	portable object	Early Classic	ya al	32A MA2a	SPIRAL	child/mother
15.	COLK0772	portable object	Late Classic	ya al la	32A MA2a ZA2	T584	child/mother
16.	COLK1003	portable object	Late Classic	ya al la wa	32A MA2a ZA2 2S2s	T534	verb
17.	COLK1440	portable object	09.15.00.00.00	ya al	32A MA2a	SPIRAL	child/mother
18.	COLK2067	portable object	Late Classic	ya? al	32A? MA2a	T126	child/mother?
19.	COLK2213	portable object	Late Classic	ya al wa	32A MA2a 2S2s	SPIRAL	verb
20.	COLK3844	portable object	Late Classic	ya al la	32A MA2a ZA2	SPIRAL	child/mother



21.	COLK4011	portable object	Late Classic	ya al wa	32A MA2a 2S2s	T534	verb
22.	COLK4118	portable object	Late Classic	ya al la	32A MA2a ZA2	T534	child/mother
23.	COLK4976	portable object	Early Classic	ya al	32A MA2a	SPIRAL	child/mother
24.	COLK5164	portable object	Late Classic	ya al	32A MA2a	SPIRAL	child/mother
25.	COLK5458	portable object	09.05.00.00.00	ya al	32A MA2a	T584	child/mother
26.	COLK5509	portable object	Late Classic	al la	MA2a ZA2	T584	relationship
27.	COLK7528	portable object	Early Classic	ya al?	32A MA2c?	T584	child/mother
28.	COLK8342	portable object	Late Classic	ya al	32A MA2a	SPIRAL	child/mother
29.	COLK8680	portable object	Late Classic	ya al wa	32A MA2a 2S2s	T534	verb
30.	COLLauSt	monument	10.01.15.00.00	ya al la	32A MA2a ZA2	T584	child/mother
31.	COLLCcb297	portable object	Late Classic	ya al la ixik	32A MA2a ZA2 PLBa	SPIRAL	child/mother
32.	COLRAB6634	portable object	09.08.00.00.00	ya al la	32A MA2a ZA2	SPIRAL	child/mother
33.	COLRuffTSt	monument	Late Classic	ya al la	32A MA2a ZA2	T584	child/mother
34.	CPNPStep	monument	09.03.00.00.00	ya al yu _	32A MA2a ZBF 000	T584	child/mother, child/father?
35.	CPNSt20	monument	09.01.10.00.00	ya al? wa? _	32A MA2a/MA2b 2S2s? 000	SPIRAL	
36.	CRCAlt21	monument	09.10.00.00.00	ya al la	32A MA2a ZA2	SPIRAL	child/mother
37.	CRCSt16	monument	09.05.00.00.00	ya al la	32A MA2a ZA2	T534	child/mother
38.	CRNDaAlAlt	monument	09.15.00.00.00	ya al ix	32A MA2a PLBa	SPIRAL	child/mother, personal name
39.	CRNDaAlAlt	monument	09.15.00.00.00	ya al la	32A MA2a ZA2	SPIRAL	child/mother
40.	CRNDaAlAlt	monument	09.15.00.00.00	ya al la ix bah ka ba	32A MA2a ZA2 PLBa AP9a AA1s XE1s	SPIRAL	child/mother, title
41.	CRNPan03	monument	09.11.16.02.08?	ya al	32A MA2a	SPIRAL	child/mother
42.	CRNSQPan04	monument	09.11.16.02.08	ya al la	32A MA2a ZA2	SPIRAL	child/mother



43.	DCBSt01	monument	09.15.10.00.00	aj mok? ki ya al la	1G4a ZA1b 1B2 32A MA2a ZA2	SPIRAL	personal name, agentive, child/mother
44.	EKBM22	monument	09.17.12.16.14	ya al	32A MA2a	T584	child/mother
45.	ENCSt01	monument	08.13.10.00.00	ya al	32A MA2a	SPIRAL	child/mother
46.	HLMStFr	monument	9.8.0.0.0	ya yal la	32A MA2a ZA2	T534	
47.	NARAlt01	monument	09.08.02.14.03	ya al	32A MA2a	SPIRAL	child/mother
48.	OXPSt12	monument	09.15.00.00.00	ya al la	32A MA2a ZA2	T534	child/mother
49.	PALTC	monument	09.12.19.14.12	ya al la k'uh ixik	32A MA2a ZA2 SG1 PLBa	Possessor	child/mother, title
50.	PALTCB	monument	09.12.19.14.12	ya al la k'uh ixik	32A MA2a ZA2 SG1 PLBa	Possessor	child/mother, title
51.	PALTFCB	monument	09.12.19.14.12	ya al la k'uh ixik	32A MA2a ZA2 SG1 PLBa	Possessor	child/mother, title
52.	PALTFRD	monument	09.12.19.14.12	ya al la _ ixik	32A MA2a ZA2 000 PLBa	Possessor	child/mother, title
53.	PALTIw	Monument	09.12.11.05.18	ya al ji ya	32A MA2c 33F 32A	SPIRAL	child/mother, title
54.	PALTSNP	monument	09.12.19.14.12	ya al k'uh ixik	32A MA2a SG1 PLBa	Possessor	child/mother, title
55.	PNGPan15	monument	09.13.15.00.00	ya al la	32A MA2a ZA2	SPIRAL	child/mother
56.	PNGSt06	monument	09.12.15.00.00	ya al la	32A MA2a ZA2	SPIRAL	child/mother
57.	PRUSt15	monument	08.19.00.00.00	ya al la	32A MA2a ZA2	T584	child/mother
58.	RSBHS01	monument	09.07.06.04.18	ya al la k'uh ixik	32A MA2a ZA2 SG1 PLBa	SPIRAL	child/mother, title
59.	TIKMT043	portable object	09.15.03.00.00	ya al la	32A MA2a ZA2	T584	child/mother
60.	TIKMT217	portable object	09.09.10.00.00	ya al	32A MA2a	T533	child/mother
61.	TIKSt05	monument	09.15.13.00.00	ya al la	32A MA2a ZA2	T534	child/mother
62.	TIKSt17	monument	09.06.03.09.15	ya al la	32A MA2a ZA2	SPIRAL	child/mother
63.	TIKSt31	monument	09.00.10.00.00	ya al la	32A MA2a ZA2	SPIRAL	child/mother
64.	TNAMon069	monument	09.17.05.07.05	ba al	XE1a MA2a	SPIRAL	title



65.	TNAMon138	monument	09.15.00.00.00	ya al k'uh ixik	32A MA2a SG1 PLBa	SPIRAL	child/mother, title
66.	UAXB13Mu	monument	09.02.00.00.00	ya al	32A MA2a	SPIRAL	child/mother?
67.	UXMAIt10	monument	10.03.12.00.00	ya al la	32A MA2a ZA2	SPIRAL	child/mother
68.	XLMPan04	monument	09.14.17.00.00	ya al la ix aj k'in ni	32A MA2a ZA2 PLBa AK2b XQ3 1S2s	T561	child/mother, title, agentive
69.	YAXHS3	monument	09.15.00.15.03	ya al	32A MA2a	SPIRAL	child/mother
70.	YAXHS3	monument	09.15.00.15.03	ya al la	32A MA2a ZA2	SPIRAL	child/mother
71.	YAXLnt10	monument	09.18.17.13.14	ya al wa	32A MA2a 2S2s	T534	verb
72.	YAXLnt10	monument	09.18.17.13.14	ya al la	32A MA2a ZA2	T534	child/mother
73.	YAXLnt23	monument	09.14.14.13.17	ya al la	32A MA2a ZA2	SPIRAL	child/mother
74.	YAXSt11	monument	09.16.01.00.00	ya al _ ixik	32A MA2a 000 PLBa	SPIRAL	child/mother
75.	ZTZB30B	portable object	Late Classic	ya al	32A MA2a	T584	child/mother
76.	ZTZLnt01	monument	Early Classic	ya al la	32A MA2a ZA2	SPIRAL	child/mother

Appendix 2: Dataset for CH'AM/K'AM prior to culling. Glyphic transcriptions are exactly as present in earlier, beta version of MHD. Objabbr1 (> Objabbr) may be used to locate data in MHD online (mayadatabase.org).

	objabbr1	objclass	objlc	blocklogosyllabic	blgraphcodes	holding site	blsem
1.	BPKSS05	monument	09.10.15.07.04	12 ik' at u ch'am	012 XN1 XQBa HE6 MA1	T533	365 cycle, accession
2.	CHNCJade1207	portable object	09.00.00.00.00	u ch'am	HE6 MA1	T533	
3.	COLK0199	portable object	09.01.00.00.00	u ch'am wa	HE6 MA1 2S2s	T533	accession
4.	COLK0555	portable object	Late Classic	u? ch'am? k'awil?	HE6? MA1? SMA?	T1030	accession?, deity name?
5.	COLK0955	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
6.	COLK0955	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name



7.	COLK0955	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
8.	COLK0955	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
9.	COLK0955	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
10.	COLK0955	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
11.	COLK0999	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
12.	COLK0999	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
13.	COLK0999	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
14.	COLK0999	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
15.	COLK0999	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
16.	COLK1005	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
17.	COLK1005	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
18.	COLK1005	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
19.	COLK1005	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
20.	COLK1005	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
21.	COLK1005	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
22.	COLK1005	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
23.	COLK1005	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name



24.	COLK1005	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
25.	COLK1302	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
26.	COLK1302	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
27.	COLK1302	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
28.	COLK1302	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
29.	COLK1302	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
30.	COLK1334	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
31.	COLK1334	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
32.	COLK1334	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
33.	COLK1334	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
34.	COLK1334	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
35.	COLK1344	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
36.	COLK1344	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
37.	COLK1344	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
38.	COLK1344	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
39.	COLK1344	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
40.	COLK1371	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name



41.	COLK1371	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
42.	COLK1371	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
43.	COLK1371	portable object	Late Classic	ch'am k'awil la	MA1 SMA ZA2	T1030	accession, deity name
44.	COLK1371	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
45.	COLK1371	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
46.	COLK1371	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
47.	COLK1371	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
48.	COLK1371	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
49.	COLK1372	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
50.	COLK1372	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
51.	COLK1372	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
52.	COLK1372	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
53.	COLK1372	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
54.	COLK1372	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
55.	COLK1372	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
56.	COLK1372	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
57.	COLK1372	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name



58.	COLK1372	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
59.	COLK1372	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
60.	COLK1372	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
61.	COLK1384	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
62.	COLK1398	portable object	Late Classic	u ch'am wa	HE6 MA1 2S2s	T533	
63.	COLK1649	portable object	Late Classic	ch'am wa	MA1 2S2s	T533	
64.	COLK1882	portable object	Late Classic	u ch'am wa	AA4g MA1 2S2s	T533	
65.	COLK2094	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
66.	COLK2094	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
67.	COLK2094	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
68.	COLK2094	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
69.	COLK2094	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
70.	COLK2094	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
71.	COLK2094	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
72.	COLK2094	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
73.	COLK2094	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
74.	COLK2094	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name



75.	COLK2572	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
76.	COLK2715	portable object	Late Classic	ch'am k'awil	MA1 SMA	T1030	accession, deity name
77.	COLK4056	portable object	Late Classic	u ch'am wa	HE6 MA1 2S2s	T533	
78.	COLK5456	portable object	Late Classic	ch'am	MA1	T533	
79.	COLK5863	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
80.	COLK5863	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
81.	COLK5863	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
82.	COLK5863	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
83.	COLK5863	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
84.	COLK5863	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
85.	COLK5863	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
86.	COLK5863	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
87.	COLK5863	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
88.	COLK5863	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
89.	COLK5863	portable object	Late Classic	ch'am ya k'awil	MA1 32A SMA	T1030	accession, deity name
90.	COLK6751	portable object	Late Classic	ch'am k'awil k'ak' ti' ch'ich'?	MA1 SMA ZBBa PXA ZZ3	T1030	accession, deity name, personal name
91.	COLK6751	portable object	Late Classic	ch'am k'awil ta jo ma	MA1 SMA 2SAs ZR1 ZM1s	T1030	accession, deity name, personal name



92.	COLK6751	portable object	Late Classic	ch'am k'awil u hut? ?? chan	MA1 SMA HE6 HE3 HTC XH3a	T1030	accession, deity name, personal name
93.	COLK6751	portable object	Late Classic	ch'am k'awil yu ku k'a' k'ak'	MA1 SMA ZBF ZC1s SBC ZBBa	T1030	accession, deity name, personal name
94.	COLK6751	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
95.	COLK6751	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
96.	COLK6751	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
97.	COLK6751	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
98.	COLK6751	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
99.	COLK6751	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
100.	COLK6751	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
101.	COLK6751	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
102.	COLK6751	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
103.	COLK6751	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
104.	COLK6751	portable object	Late Classic	ch'am wa k'awil	MA1 2S2s SMA	T1030	accession, deity name
105.	COLK6751	portable object	Late Classic	ch'am wa k'awil ta tayel k'inich	MA1 2S2s SMA 2SAs MA3 SN3	T1030	accession, deity name, personal name
106.	COLK6751	portable object	Late Classic	u ch'am wa k'awil	HE6 MA1 2S2s SMA	T1030	accession, deity name
107.	COLK8941	portable object	Early Classic	ch'am wi ya	MA1 1S1s 32A	T533	
108.	COLPqCR778c	portable object	09.00.00.00.00	u ch'am wa	HE6 MA1 AB1s	AB1s (wa)	



109.	Conch shell trumpet	Portable object	Early Classic	u ch'am yu b'I		T533	
110.	CPNAltQ	Monument	09.17.05.03.04			T1030	
111.	CPNAltQ	Monument	09.17.05.03.04	u ch'am la te' k'o	HE6 MA1 ZA2 2G1b ZCFa	T534	
112.	CPNSt04	Monument	09.14.15.00.00	ch'am _ ik' hun	MA1 000 XN1 1B5a	T533	
113.	CPNSt04	Monument	09.14.15.00.00	ch'am xa _ mok? ki	000 MA1 1GFs 000 ZA1b 1B2	T533	
114.	CPNStj	monument	09.13.10.00.00	ch'am ya k'awil k'inich _ yax k'uk' :mo'	MA1 SN3 000 BP5a	T1030	personal name, dynastic event
115.	CPNStj	monument	09.13.10.00.00	ch'am xa _ _ na 08 hab	MA1 1GFs 000 000 1G1 008 XH2	T533	dynastic event
116.	CPNStj	monument	09.13.10.00.00	ch'am xa mo? cho ba? ka	MA1 1GFs HJ1 BP5s? XE1s? AA1s	T533	dynastic event
117.	CPNStj	monument	09.13.10.00.00	i yu wa la ch'am xa tzi pi?	YM1a ZBF 2S2s ZA2 MA1 1GFs ZHEs ZC5?	T533	dynastic event
118.	CRC Structure B19 MonFrag05	Monument	Late Classic	ch'am	MA1	T1030	
119.	CRNPan01	Monument	09.12.05.07.04	ch'am ni ya ajaw le	MA1 1S2s 32A ZB1 1SC	T533	
120.	DPLHS1	monument	09.14.13.00.00	u ch'am ya' a	HE6 MA1 PE1 AK2s	T533	dynastic event, object ref
121.	DPLSt08	monument	09.14.15.05.15?	u ch'am wa	AA4p MA1 2S2s	T533	accession
122.	PAL House A-D Pal Tablet	Monument	09.14.08.14.15	U ch'am wa		T533	
123.	PAL TFC WT	Monument	09.12.19.14.12	Ch'am k'awil la xa		T1030	
124.	PALT14T	Monument	09.13.13.15.00	U ch'am ma k'awil la		T1	
125.	PALT14T	Monument	09.13.13.15.00	Yax ch'am k'awil		T1030	
126.	PALT14T	Monument	09.13.13.15.00	u ch'am wa	HE6 MA1 2S2s	T533	dynastic event
127.	PALT14T	Monument	09.13.13.15.00	Ch'am k'awil la	MA1 2S2s	T533	
128.	PALT19PI	Monument	09.15.05.00.00	u ch'am wa ob	HE6 MA1 2S2s 33H	T533	dynastic event



129.	PMASt01	Monument	09.16.15.00.00	u ch'am la tun _ k'inich	HE6 MA1 ZA2 ZC1a ZOO SN3	T528	
130.	PNGPan02	monument	09.11.15.00.00	ch'a ch'am wa	ZG1s MA1 2S2s	T533	dynastic event
131.	PNGPan02	monument	09.11.15.00.00	ch'am ma	MA1 ZM1s	T533	dynastic event
132.	PNGPan02	monument	09.11.15.00.00	i ch'am wa	YM1a MA1 2S2s	T533	dynastic event
133.	PNGSt03	monument	09.14.00.00.00	u ch'am wa te mu	HE6 MA1 2S2s XN3 ALE	T533	dynastic event, object ref
134.	PRUS33	monument	09.13.00.00.00	ch'am wi k'awil	MA1 1S1s SMA	T1030	accession, deity name
135.	PRUS34	monument	09.13.00.00.00	ch'am wi k'awil	MA1 1S1s SMA	T1030	accession, deity name
136.	PUSStH	Monument	09.11.00.00.00	Ch'am-wa k'awil		T1030	
137.	QRGMon06	Monument	09.16.10.00.00	Ch'am-wi k'awil		T1030	
138.	QRGStE	monument	09.17.00.00.00	u ch'am k'awil k'ak' til chan	HE6 MA1 SMA ZBBa MB4 XH3a	T1030	accession, deity name, personal name
139.	TIKSt31	monument	09.00.10.00.00	u ch'am wa	HE6 MA1 2S2s	T533	accession
140.	YAXLnt01	monument	09.16.06.00.00	09? ch'am k'uh? ti' hun na	009? MA1 SG1? PXA 1B5a PL1s	T533	Glyph G01, Glyph F
141.	YAXLnt03	Monument	09.16.06.00.00			T533	
142.	YAXLnt03	Monument	09.18.17.13.14?			T534	
143.	YAXLnt42	Monument	09.16.06.00.00			T533	



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