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On Aegean spices: decipherment prospects on Linear A and B spice-related signs

<https://doi.org/10.1515/kadmos-2025-0002>

Abstract: The Mycenaean palaces of the last phases of the Late Bronze Age were productive centres focused on few, if flourishing, industries. One such industry was that of perfumed oil, especially in the centre at Pylos, Messenia. The productive process, recorded on tablets written in the Linear B script, is particularly terse. Moreover, some ingredients, recorded via logograms and monograms, remain undeciphered. Here we propose some new readings of these commodities, drawing comparisons from Linear A, one of the scripts used in Minoan Crete. The case studies presented here, and their interpretations, shed light on the level of attention paid by the palatial administrators to orthographic practices geared towards the clear and unambiguous rendering of logograms. This in turn reinforces the idea that the Linear B script, if unsuited to writing the complexities of the Greek language, was a functional tool to precise and explicit readings of commodities.

Keywords: Mycenaean Linear B, Minoan Linear A, Bronze Age Aegean archaeology, logography, decipherment.

1 Introduction: spices in the Bronze Age Aegean

The Mycenaean civilisation (*ca.* 1450–1200 BCE), flourished in continental Greece and the island of Crete, was renowned for its production of perfumed olive oil. Evidence from the palaces of Pylos in Messenia and Knossos on Crete showcase a complex industry, with specialised individuals working in laboratories tied to

Article note: The research contained in this article is part of the ERC Project ‘INSCRIBE. Invention of Scripts and Their Beginnings’, awarded to S. Ferrara. This project has received funding from the European Research Council (ERC) under the European Union’s Horizon 2020 research and innovation program (grant agreement No. 771127). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

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the production and refinement of spices and oil (Foster 1974; Shelmerdine 1985; Bendall 2007; Fappas 2010). By using a down-the-line trade model, it is possible to reconstruct (Bushnell 2012, 203–204) that most of the oil was channelled into the many trading networks that connected the Greek mainland to Cyprus and several sites on the eastern Mediterranean coast. Arguably, this industry constituted a flourishing unique selling proposition of the Mycenaean elites and a propulsive form of wealth and prestige within the economic sphere and *vis à vis* neighbouring cultures.

Yet, the perfume industry, as described in the corpus of Linear B documents (primarily clay tablets), which functioned as an archival instrument of administrative regulation of all palatial production, still presents aspects that are poorly understood. Linear B tablets, notoriously terse and laconic in nature, do not describe in any detail the process by which perfumed oil was manufactured, nor do they explain the recipes followed by the perfume-makers. Much must be deduced, and several logograms, which could shed light on the ingredients used, are still undeciphered. This article aims to offer new readings of these undeciphered signs, an endeavour which has the potential to change our reconstruction of this important sector of the Mycenaean economy.

In what follows, we consider a select number of cases of monograms and logograms tied to the inventories of spices used in the perfume laboratories and mentioned in lists of miscellaneous items linked with perfumery. In order to shed light on their meaning, we propose a grounded reading hypothesis, hinged also on evidence drawn from the undeciphered Linear A script. The Linear A syllabary, a precursor to Linear B, shares a number of features with it, and based on their formal similarities we can offer compelling, if speculative, new interpretations.

This article features two case-studies, both connected to the attention paid to detail by Mycenaean scribes to disambiguate logograms and their spelling. The first case-study (Decipherment prospect 1) centres around a critical comparison between two composite logograms (Linear B *157 and Linear A A646, see Fig. 1 and Fig. 2 respectively), whose interpretation is still open and which we propose is connected on graphic as well as semantic grounds (if not linguistic, *stricto sensu*). The second case-study (Decipherment prospect 2) examines a Linear B sign-sequence occurring both as a monogram (KA+PO, performing a logographic function) and in full spelling (*ka-po*).

We argue that these two alternative graphic renderings were not interchangeable, as they were used to disambiguate between different commodities. The results (already a stand-alone within each case-study) will be integrated further to evaluate the significance of sign composition patterns in Linear A and Linear B writing, and the role alternative graphic strategies played in the commodity recording process. This integrated analysis has the strong potential to offer val-

uable insights into the cognitive workings of past reading processes. Our examination in fact shows that, despite the grammatological pitfalls of the Linear B writing system for unambiguous notation of the Greek language,¹ logographic practice was much more accurate than standardly assumed, allowing for precise reading and univocal interpretation of the commodities recorded. In this article, we not only shed light on the modalities of logographic writing (graphic strategies), but also make considerable progress in understanding and deciphering two still non-identified Linear B logograms (*157 and *127/*KA-PO*). In doing so, we therefore put forward a cutting-edge methodology to advance the state of the art.

2 Decipherment prospect 1: a new logogram for ‘plant-root’ (*RADix*)?

2.1 Linear B logogram *157

Several signs of the Linear B repertoire are still undeciphered, especially in the case of logograms.² This is due to their meagre number of attestations or to a dearth of contextual details. Some undeciphered logograms occur on a limited number of tablets from Pylos dealing with the perfume industry, and we can frame them as potential ingredients used by the perfume makers, alongside, for example, logograms *127 and *157.³ In this section we discuss Linear B logogram *157 (Fig. 1) and propose a plausible interpretation of its shape and meaning. On graphic grounds, *157 is a composite sign consisting of two elements: a lower



Fig. 1: Linear B logogram *157 (drawing by Salgarella)

¹ Linear B, being a syllabary, is often deemed to be ill-suited for writing Greek due to its high level of ambiguity (for example, the word *pa-te* could be read as both *πατήρ* /*patēr*/ ‘father’ and *πάντες* /*pantes*/ ‘all’). To circumvent this issue, Linear B writers devised several orthographic conventions (also known as ‘spelling rules’; lastly Salgarella 2024) to maximise phonological rendering and minimise misunderstandings.

² On Linear B still undeciphered syllabograms see Judson 2020.

³ For the most up-to-date list of Linear B signs see *Docs*³ 96–7 (syllabograms), 127–9 (logograms).

used to extract lanolin,⁶ a fat still employed in the manufacture of cosmetics for its moisturising properties.

However, the use of lanolin for perfume-making has some drawbacks: (i) lanolin requires a long and complex process to be extracted; (ii) it has a very strong, unpleasant smell, making this substance unsuitable for perfume-making; (iii) it is never mentioned as a perfume ingredient in later sources on perfume-making.⁷ Notably, in perfume-making contexts wool has been shown to have been used also for another purpose, namely as a filtering substance (Lily and Curt Beck 1978, 213–15; Shelmerdine 1985, 19): a small amount of wool was probably placed at the end of a funnel and used as a filter to clear scented oil from remnants of macerated ingredients and aromatics.

We may, however, entertain the possibility that *157 is yet another (unidentified) ingredient used for perfume-making. In this respect, later comparative evidence on perfume-making offers compelling insight. The treatises *De Materia Medica* by Dioscorides (first century AD) and *De Odoribus* by Theophrastus (fourth century BCE) mention several raw materials necessary for perfume-making, discuss properties and characteristics of perfume ingredients, and list various recipes to make perfumed oils. In particular, Dioscorides describes the first phase of hot maceration as *stypsis* (in which the oil is made astringent and absorbent): the ingredients he mentions in relation to the process of *stypsis* are the same as those listed on the Pylos tablets mentioned earlier.

In addition, among the several ingredients necessary for the *stypsis*, both Dioscorides and Theophrastus mention ground rhizomes of calamus. The calamus plant has a large root full of rhizomes, from which leaves and *canulae* depart. This plant originates from Asia, but it was imported to Europe in ancient times, as is demonstrated by the fact that both the Egyptians and the Romans used calamus reeds as nibs. There are no references to calamus in Linear B tablets and we cannot be sure that calamus was known and used in the Mycenaean period. However, the assumption can be made that, to reach the desired outcome, the Mycenaeans may have employed another functionally comparable type of root in the *stypsis* for perfume-making: *157 may be a suitable candidate to fulfil this role. Three arguments can be put forward in support of this claim: (i) *157 may be associated with the word *wi-ri-za* ‘root’ (with AB 40/*wi* functioning as acrophonic abbreviation of the word); (ii) on graphic grounds, the lower element of *157 looks

⁶ Killen’s interpretation of *157 as lanolin is based on three later sources: Pliny the Younger, *Nat. Hist.* (XXIX, 2, 10); Ovid, *Rem. Am.* (354); Dioscorides, *De Mat. Med.* (II, 74).

⁷ Dioscorides, *De Materia Medica*; Theophrastus, *De Odoribus*.

like an iconic rendering of a plant root (with protruding rhizomes over a central stalk); (ii) the overall shape of *157 is itself reminiscent of a calamus plant.

The choice of using a logogram (*157) instead of the full-spelling of the word (*wi-ri-za*) it stands for can be explained by the risk of misreading and misinterpreting two commodities that were to be taken as distinct and happened to appear on the same tablets belonging in the PY Un-series. Within the entire Linear B corpus, the full-spelling of the word (*wi-ri-za*) occurs on four tablets only (split across the sites of Pylos and Knossos): PY Un 249, KN Od 2026, KN Od 8202 and probably KN Od 44 (fragmentary). The Knossos Od-series deals with distributions of wool, whereas the Pylos Un series contains, to a great extent although not exclusively, lists of commodities used for banqueting.⁸ Although PY Un 249 is the only Pylos document in which we can find the full-spelling *wi-ri-za*, by comparing this attestation with those from Knossos, we can infer that this term is always found in association with wool. By contrast, logogram *157 is only attested on tablets of the PY Un-series dealing with distributions of raw materials to perfume-makers.

We may therefore assume that the full-spelling *wi-ri-za* referring to both ‘wool’ and some type of ‘plant-root’ may have caused confusion and led to unavoidable misunderstandings. On these grounds, we argue that Linear B writers adopted different graphic strategies to disambiguate between two commodities: full-spelling of the word (*wi-ri-za* ‘root’) was reserved to refer to ‘wool’, whereas sign-composition (*157 ‘root’) was reserved to refer to the plant-root. The choice of creating a composite sign (logogram) to refer to a commodity which we may take as a spice (or plant-root used, like spices, as an ingredient for perfume-making) is in line with the use of logograms to record spices on Linear B tablets dealing with perfume-making. This is additional reason to take *157 as an ingredient for perfume-making, and arguably as the root of a spice.

Further evidence for the identification of *157 as a spice are the copious quantities of this commodity allocated to perfume-makers: 10 units are recorded on PY Un 249, 16 units on PY Un 267, 28 units on PY Un 616. Overall, these are significant amounts,⁹ even though it is unclear whether these quantities refer to the number of items (i.e. 10 pieces of root), or to the standard Linear B unit of measurement for dry commodities (i.e. 1200 dry roots, with 1 unit corresponding to 120 litres). If *157 is indeed a root, both possibilities are valid. In case it is a unit of measure-

⁸ The PY Un series is defined on epigraphical grounds (page-shaped tablets showing mixed logograms). Although many PY Un tablets have been interpreted as referring to banqueting, this series is not a coherent set of documents with a common administrative purpose.

⁹ Lower absolute values (than traditionally assumed, e.g. *Docs*²) for the Linear B measure signs for volume are suggested in de Fidio 2024.

ment, we are dealing with a very large amount of produce: 1200 litres of roots in PY Un 249, 1920 litres in PY Un 249, and 3360 litres in PY Un 616.

2.2 Linear A composite sign A646

We can take this argumentation a step further. Linear B *157 may have an antecedent in Linear A, namely A646 (Fig. 2). Like Linear B *157, A646 is a composite sign:¹⁰ the lower element is classified as sign A341 (by the editors of *GORILA*)¹¹ and is still unidentified, while the upper element is read as AB 39/*pi*. It is here argued that the shape of A341 is compatible with the lower element of Linear B logogram *157, and may therefore be taken as the same sign (at least on a purely graphic level). Interestingly, also A341 is never attested in isolation as a simple sign in Linear A, but only occurs in association with AB 39/*pi* in composite sign A646.



Fig. 2: Linear A composite sign A646 (drawing by Salgarella)

Linear B *157 and Linear A A646 show a number of common features: (i) both are two-element composite signs; (ii) both are constructed around a shared (lower, S-shaped) element of comparable shape, which is never otherwise attested in isolation as a simple sign in either script; (iii) both show an additional (upper) sign belonging in the syllabic set (thus allowing a phonetic reading).¹² We argue that the lower (S-shaped) element common to both signs (and classified as A341 in Linear A) may be understood as the iconic representation of a plant root, most precisely a tuberous root (*calamus*, as argued earlier) characterised by bulging

¹⁰ On composition patterns of Linear A composite signs see Salgarella 2020, 51–149; Salgarella 2022.

¹¹ The conventional Linear A sign list is given *GORILA* V, xxii–xxvii.

¹² On the validity of the backward projection of Linear B sound values to Linear A see Steele and Meissner 2017.

extremities. We therefore suggest this element be taken as the logogram for ‘root’, for which we propose the nomenclature *RADix*,¹³ in both Linear A and Linear B.

Further evidence in support of this interpretation is the reading of the upper element of Linear B *157 as /wi/ (AB 40). As illustrated in section 2.1, syllabogram AB 40/wi may be taken as the phonetic abbreviation (acrophonic) of the Linear B term *wi-ri-za* ‘root’. Its function was therefore to facilitate identification and reading of the lower (iconic) element of *157, the logogram for ‘root’ (*RADix*). In light of this interpretation, we argue that the upper element of A646 (i.e. AB 39/pi) worked in the same way in Linear A, functioning as an acrophonic abbreviation of the Minoan word for ‘root’ (not elsewhere attested nor so far identified on the extant Linear A texts). The possibility can therefore be entertained that the Minoan word for ‘root’ started with the reconstructed phonetic value /pi/, or an approximate one.

Linear A composite sign A646 is a *hapax* on tablet HT 33 (Late Minoan IB; *GORILA* I, 62–3; Fig. 3), coming from the site of Haghia Triada (central Crete). HT 33 is understood to record miscellaneous commodities, as Schoep (2002, 82) takes it as a Type IB tablet, which is a coherent format type recording a range of agricultural commodities with several unidentified logograms. The text of HT 33 is only

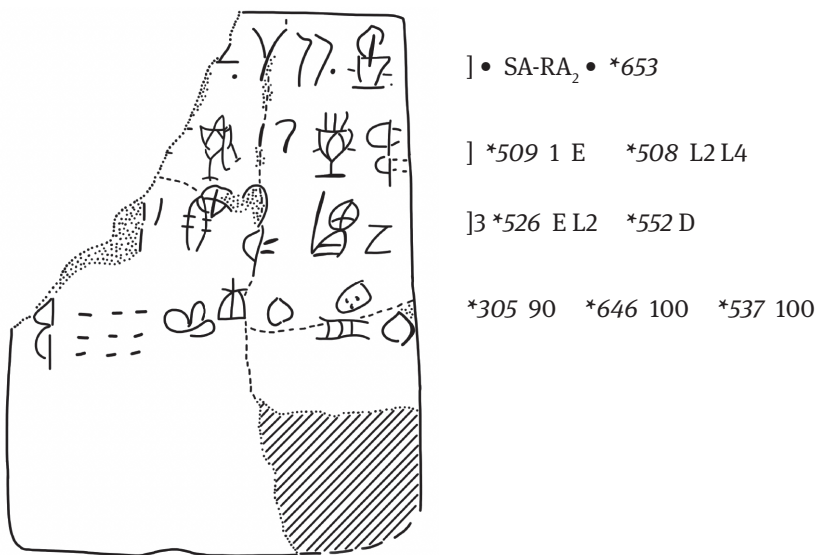


Fig. 3: Linear A tablet HT 33 (after *SigLA*)

¹³ Latin for ‘root’, in accordance with the convention of referring to logograms by using Latin terminology.

partially readable, as the tablet is damaged on the upper left side. The preserved text shows a list of unidentified logograms (in order, A653, A509, A508, A526, A552, A305, A646, A537), preceded by the sign-sequence $SA-RA_2$ in the heading (most likely a transaction term).

No one of the logograms occurring on HT 33 is identified with certainty, nor is any of these continued into Linear B. On line 1., we have A653, which is a vessel logogram (A401^{VAS} + A304); on line 2., A509¹⁴ and A508 may also represent vessel shapes,¹⁵ and their individual components are identified as $AB\ 16/qa + [?] + AB\ 27/re + AB\ 50/pu$ and $AB\ 16/qa + [?] + AB\ 27/re$ respectively by *GORILA*'s editors; on line 3., A526 consists of signs $AB\ 38/e + AB\ 77/ka$, followed by A552 combining signs $AB\ 73/mi + AB\ 57/ja + AB\ 77/ka$ (according to *GORILA*, but this interpretation is doubtful). On line 4., the first sign is simple sign A305,¹⁶ followed by A464 (A341 + $AB\ 39/pi$) and A537 ($AB\ *56 + AB\ 78/qe$).

The quantities of agricultural commodities associated with the logograms attested on HT 33 are small (1 unit or fractional subunits, i.e. E, L2, L4, D). This means that these commodities could be fractioned and were used, as well as needed, in lesser amounts. Hence, an interpretation of any (or all) of these logograms as spices (or aromatics) is not to be excluded, although it cannot be incontrovertibly proved on present evidence. Only the last three logograms (occurring on line 4.) are associated with larger, whole quantities: for A305, 90 units are recorded; for A646 and A537, 100 units each are recorded. This circumstance is relevant to the above discussion of Linear B logogram **157*, which is usually recorded in large amounts and with whole numbers: this may be further evidence in support of the parallel between Linear B **157* and Linear A A646, as well as arguing for them to stand for the same (or a comparable) commodity, likely to be a spice.

3 Decipherment prospect 2: *ka-po* (fruit) ≠ *KA+PO* (spice)

We now turn to the second case-study, which works in parallel, as it is tied to orthographic rules for disambiguation. In Linear B, two sign combinations are

¹⁴ The shape of this sign on HT 33 is also compatible with A510 (for comparative analysis look up A510 and A509 in *SigLA*, which follows the standard transcriptions given in *GORILA*).

¹⁵ On signs A508–511 and their contextual attestations (only occurring at Hagia Triada) see Schoep 2002, 130. These signs only occur in association with agricultural products in both whole numbers and fractions.

¹⁶ A305 is common at Hagia Triada. According to John Younger it may relate to personnel (see Younger's Academia.edu paper 'Introduction').

attested consisting of the same two signs (AB 77/*ka*, AB 11/*po*), but placed in different graphic configurations: these are *ka-po* and *KA+PO*. *ka-po* is a linear sign-sequence representing the full-spelling of a word, whereas *KA+PO* is a ligature (monogram, conventionally numbered *127) used as a logogram to record a commodity. *ka-po* and *KA+PO* are standardly given the same phonetic reading (i.e. Greek καρπός /karpos/ ‘fruit’), and understood to represent the same word spelled out in different graphic ways (sign-sequence vs monogram).¹⁷ Objections to this univocal reading of *ka-po* and *KA+PO* have been raised by a number of scholars, which we discuss in what follows.

Let us first review the contexts in which *ka-po* and *KA+PO* occur. On the Linear B evidence, the two forms (*ka-po* and *KA+PO*) are never attested in association on the same entry (nor tablet). *ka-po* is attested on one document only: KN F 841.5, the text of which is given below (from *DĀMOS*).¹⁸

KN F 841

- | | | |
|----|--|---------------------|
| .1 |]-ti-ja , sa-pi-ti-ṛe-we-jo | [|
| .2 |]a-di-*22-sa | GRA+PE T 5 NI 8[|
| .3 |]ṛo-di-mi-zo-jo[|] , GRA+PE 2 NI 34[|
| .4 | pa-i-to , mi-sa-ra-jo , sa-pi-ti-ne-we-jo[| |
| .5 | su-za , NI 75 | ka-po , e-[|
| .6 |]wa , OLIV 46 | e-ra-wa[|
| .7 |] | vac. [|
| .8 |] | vac. [|

On tablet KN F 841.5, *ka-po* is likely to refer to the commodity ‘olives’, as the phrasing may be restored as *ka-po e-[-ra-wa OLIV]* (/karpoi elaiwās/), namely ‘fruits of the olive tree’. The following line (l. 6) arguably shows a comparable textual structure, which can be restored as *e-ra-]wa , OLIV 46*. If this reconstruction holds true, the text is therefore characterised by redundancy, given that logogram *OLIV* (olives) would follow the full-spelling (*ka-po e-ra-wa*) of the item recorded. Likewise, the preceding entry (l.5) observes the same redundancy principle, as it reads: *su-za , NI 75*: logogram *NI* (standing for ‘figs’)¹⁹ is preceded by the full-spelling of the item recorded, i.e. *su-za* (gen. sing. of **sukya* > *σύσσα

¹⁷ *DMic* s.v. *ka-po*; *Docs*² 223, 440, 550.

¹⁸ In *DĀMOS*, *ka-po* is also restored on tablet fragment KN F 6030 (reading *]ka-po / vest.[]*), whereas *DMic* mentions KN F 841 only.

¹⁹ *NI* has been demonstrated to be the acrophonic abbreviation of νικύλεον /nikuleon/, the Minoan word for ‘fig’ (Neumann 1962).

/sussa/ ‘fig-tree’, most likely with ellipsis of *ka-po*).²⁰ *ka-po* (recorded in whole numbers) thus lends itself to being interpreted as ‘fruit(s)’, ‘pieces of fruit’, and is therefore to be taken as a general term, in need for further specification for unambiguous identification of the item (kind of fruit) recorded. By contrast, monogram *KA+PO* (Fig. 4) is never followed by another logogram, nor is it ever preceded by the full spelling of a specific kind of ‘fruit’.



Fig. 4: Linear B monogram *KA+PO* (drawing by Salgarella)

The monogram is attested by itself, only followed by numerals (units and fractions), on PY Un 249.3 (*KA+PO* T6), 267.7 (*KA+PO* 2 T5), 592.2 (*KA+PO* 3 T4), 616.2 (*KA+PO* 4). As illustrative example, the text of PY Un 267 is given below (from *DĀMOS*):

PY Un 267

- .1 o-do-ke , a-ko-so-ta
- .2 tu-we-ta , a-re-pa-zo-o
- .3 tu-we-a , a-re-pa-te [] , ze-so-me []
- .4 ze-so-me-no [] ko []
- .5 ko-ri-a₂-da-na AROM 6
- .6 ku-pa-ro₂ AROM 6 *157. 16
- .7 KA+PO 2 T 5 VIN 20 ME 2
- .8 LANA 2 VIN 2
- .9-.11 vacant

This contextual use of monogram *KA+PO* (if compared to the full-spelling *ka-po*) may suggest that the two forms (*KA+PO* and *ka-po*) are not linguistically related and may well stand for different lexical items. Even more so, if we consider the places of attestation of *KA+PO* and *ka-po*: *KA+PO* is only attested at Pylos, while

²⁰ *DMic* s.v. *ka-po*; *Docs*² 440.

ka-po only at Knossos (at least on present evidence).²¹ Moreover, the tablets where *KA+PO* occurs never record fruit, but rather items such as: spices (*123/*AROM*), wool (*146/*LANA*), *154 (animal hide?), and most interestingly also *157 (PY Un 616.3). We therefore suggest that the two forms (full-spelling vs ligature) were used for graphic disambiguation of the items recorded: full-spelling *ka-po* for καρπός /karpos/ 'fruit' (*DMic* s.v.; *Docs*² 223, 440, 550; *Interpret*, 301) vs ligature *KA+PO* for κάρφος /karpfos/ 'dry stalk/stick' (Sacconi 1972; Foster 1974, 118–21).

Anna Sacconi (1972) is the first scholar to argue that *KA+PO* and *ka-po* are unlikely to represent the same word and are therefore to be taken as etymologically distinct. She points out that the contexts in which *KA+PO* occurs stand in stark contrast to where (KN F 841) *ka-po* occurs: *KA+PO* is always recorded alongside other spices for perfume making, headed under the general term *tu-we-a* (*θύφεα /thuweha/, cf. alphabetic Greek θύεα /thuea/), usually translated as 'spices for the preparation of perfume to give scent'²² or 'aromatics for unguent to be boiled'.²³ Hence, the interpretation of *KA+PO* as an ingredient for perfume making (within the semantic field of aromatics) is preferred over 'fruit' (*ka-po*). Sacconi suggests *KA+PO* be read as κάρφος /karpfos/ 'dry stalk/stick'²⁴ of a spice, which she argues to be cinnamon, based on Herodotus mentioning κάρφεια /karpheia/ 'bark' in connection with κιννάμωμον /kinnamōmon/ 'cinnamon' (Herodotus III, 111). She thus contends that κάρφος /karpfos/ was the Greek word for cinnamon, as opposed to the Semitic-derived word κιννάμωμον /kinnamōmon/.

An alternative reading of *KA+PO* is put forward by Ellen Foster (1974, 118–21). Although she agrees with Sacconi on distinguishing *KA+PO* from *ka-po*, Foster rejects the interpretation of κάρφος /karpfos/ as 'cinnamon', on the grounds that cinnamon (a spice not native to the wider Mediterranean region) could only have arrived in the Aegean from the far East through Semitic intermediaries. Thus, in Foster's view, Greek-speaking Mycenaeans (or even Minoans) are likely to have adopted the Semitic-derived word κιννάμωμον /kinnamōmon/ for cinnamon (although not attested on the extant Linear B evidence), as they did for other imported spices (for example, *sa-sa-ma* /sāsama/ 'sesame seeds', *ku-mi-no* /kuminon/ 'cumin seeds'). Foster then suggests that κάρφος /karpfos/ may refer to another spice, more common in the Mediterranean and widely used as an

²¹ This pattern of occurrences also suggests differences in (site-specific) administrative practices.

²² *DMic* s.v. *tu-wo*.

²³ *Docs*³ 748.

²⁴ The term κάρφος /karpfos/ ('arid stalk, twig, halm, hay', Beekes 2010 s.v.) has no certain etymology and is likely to be of non-Indo-European origin (Chantraine 1968 s.v.; Beekes 2010 s.v.).

aromatic in classical perfumery: fenugreek. Her argument is based on evidence (Dioscorides II, 102) taking κάρφος /karp̄hos/ as τῆλις /tēlis/ ‘fenugreek’.²⁵ The limits of interpreting κάρφος /karp̄hos/ as ‘fenugreek’, however, are acknowledged by the scholar, appreciating that this is to remain a speculative, yet educated, guess.

The term κάρφος /karp̄hos/ has no certain etymology but is unlikely to be of Indo-European origin.²⁶ One may therefore entertain the possibility that it belongs in the Minoan substratum. The Linear A evidence, however, does not help in this respect. Neither is the sign-sequence *ka-po* attested in the Linear A corpus, nor can a graphic antecedent to *KA+PO* be found among Linear A composite signs (the closest parallel being composite sign A554 = AB 77/*ka* + AB 08/*a*, of unknown interpretation). Furthermore, no word (or logogram) for either ‘cinnamon’ or ‘fenugreek’ has so far been identified in the surviving Linear A texts. On purely linguistic grounds, we are therefore left to interpreting *ka-po* and *KA+PO* within the remit of Linear B. However, the Linear B graphic strategies to differentiate between lexical items (full-spelling vs ligature) may well be thought to have been inherited from Linear A, in particular from the productive practice of combining signs to create logograms (and arguably also ideograms, and sematograms *lato sensu*).

4 Graphic disambiguation strategies: full-spelling vs ligature

In the above discussion, evidence has been provided of graphic strategies used for disambiguation of items recorded on Linear B administrative documents. In particular, it has been shown that, in Linear B, full-spelling and ligature (sign composition) were used as two alternative strategies, with the latter preferentially adopted straightforwardly to refer to commodities (logographic function).

In Linear A, sign composition is the main strategy adopted to create composite signs with ideographic/sematographic function to record commodities. Linear A simple signs can behave as both syllabograms and logograms/ideograms, whereas composite signs only behave as ideograms/sematograms (Salgarella 2020, 51–149, 371–80). Very rarely (if at all) commodities are recorded in full spelling (reserved to, e.g., anthroponyms, toponyms, transaction terms) in Linear A, which strongly prefers sign composition to fulfil ideographic/logographic func-

²⁵ The term τῆλις /tēlis/ is without certain etymological interpretation (Chantraine 1968 s.v., Beekes 2010 s.v.).

²⁶ Chantraine 1968 s.v.; Beekes 2010 s.v.

tions. Linear A composite signs may allow a phonetic reading of their components (for example, A559 = *MA+RU*),²⁷ although it is unclear whether all (or most) composite signs shall be taken as monograms (or perhaps sematograms).²⁸

These two alternative graphic strategies deployed to record commodities give us valuable insights into the cognitive basis of contemporary reading processes: while iconic commodities are usually drawn as easily recognisable logograms (for the instantaneous interpretability of their shape), non-iconic commodities are either expressed through sign composition (ligatures and monograms) or fully spelled out. Linear B clearly adheres to this principle: iconic commodities are drawn as simple (iconic) graphic units fulfilling a logographic function (for example, *106/*OVIS* ‘sheep’, *108/*SUS* ‘pig’, *107/*CAPer* ‘goat’, *122/*OLIVa* ‘olive’, *131/*VINum* ‘wine’, *159/*TELA* ‘textile’),²⁹ while non-iconic commodities are either recorded in full-spelling or by monogram (for example, *135/*ME+RI*, monogram for μέλι /meli/ ‘honey’, often found in association with full-spelling *me-ri*; *156/*TU+RO₂*, monogram for τυρός /turos/ ‘cheese’; *146/*LANA*, logogram for ‘wool’, inherited from Linear A monogram A559 = *MA+RU*).³⁰ This evidence suggests that Linear B resorted to sign-composition for commodity recording (a practice inherited from Linear A, its chosen preferential practice) when a commodity was not highly iconic, or easily ‘iconicisable’. We have seen that, in Linear B, this applies to monogram *KA+PO* ‘spice’ (as opposed to syntagm *ka-po e-ra-wa OLIV* ‘fruits of the olive tree’), as well as *157 = *RADix* + AB 40/*wi* ‘plant-root’ of a spice (as opposed to syntagm *wi-ri-za LANA*).

This demonstrates that, although Linear B is deemed to be an ambiguous writing system, with a considerable mismatch between writing and phonological interpretation,³¹ the Linear B writers developed effective graphic strategies to disambiguate between logograms, namely commodities. If Linear B orthography

²⁷ This Linear A composite sign, used as logogram for ‘wool’ in Linear A (and continued into Linear B as logogram *146/*LANA*), is also a monogram spelling out the Minoan word for ‘wool’ (reading /maru/ or /malu/), which survived into alphabetic Greek as μάλλος /mallos/ ‘wool/fleece’ (see Hesiod, *Works and Days* 234).

²⁸ On the readability of several Linear A composite signs as monograms, see Salgarella 2022.

²⁹ Note that signs functioning as ideograms for ‘sheep’, ‘pig’ and ‘goat’ also show syllabic usage (hence values): *106/*OVIS* ‘sheep’ reads as /qi/, *108/*SUS* ‘pig’ reads as /au/, *107/*CAPer* ‘goat’ reads as the still undeciphered sign *22 (on the undeciphered signs of Linear B see ultimately Judson 2020).

³⁰ The list of Linear B logograms is given in *Docs*³ 127-9; the list of Linear A composite signs is given in *GORILA V*, xxiv–xxvii.

³¹ Linear B syllabic structure consisting of open syllables does not allow for the straightforward notation of final consonants and consonantal clusters, at times resulting in ambiguity as to the correct reading and interpretation of words (see discussion in Salgarella 2023).

does have shortcomings, logographic habits appear to have been more clearly codified at a systemic level to avoid ambiguity in commodity recording. After all, the purpose of Linear B (and Linear A) administrative documents was to record the inflow and outflow of goods within palatial centres in the most accurate, less ambiguous fashion. Getting insights into the inner workings of these systems, as shown in this article, is of paramount importance and the first step towards establishing a methodological framework enabling us to shed light on a plethora of still unidentified signs (esp. logograms) that we cannot yet ‘read’ nor identify with certainty. Furthermore, we may also wonder, from a purely methodological and theoretical standpoint, whether the graphic strategies identified in this article (primarily used for disambiguation purposes) also apply to other Linear A and B non-identified (non-iconic) logograms expressed through sign composition, which in our view is a working hypothesis worth exploring further.

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