

PO-NI-KI-JO AMONG THE DYE-PLANTS OF MINOAN  
CRETE\*

Several interesting questions concerning the climate, flora and industries of Bronze Age Crete centre round the possible meanings of *po-ni-ki-jo* in the B and Ga tablets from Knossos.

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\* In addition to the conventional abbreviations the following are also used:

Apostolake: 'Α. Ἀποστολάκη, Βαφική, βαφικαὶ ὕλαι καὶ χρῆσις αὐτῶν, Λαογραφία ΙΔ', 1952, 71—124.

Chadwick: J. Chadwick, Relations between Knossos and the rest of Crete at the time of the Linear B tablets, Πεπραγμένα τοῦ Γ' Διεθνoῦς Κρητολογικοῦ Συνεδρίου, 1971, A, 1973, 40—5.

Chantraine: P. Chantraine, A propos du nom des Phéniciens et des noms de la pourpre, Studii Clasice 14, 1972, 7—15.

Documents<sup>2</sup>: M. Ventris and J. Chadwick, Documents in Mycenaean Greek, 2nd edition by J. Chadwick, 1973.

Forbes: R. J. Forbes, Studies in Ancient Technology 4, 1956, 98—148.

Frangaki (1969): E. Φραγκάκι, Συμβολή εἰς τὴν δημώδη ὀρολογία τῶν φυτῶν.

Frangaki (1974): E. Φραγκάκι, Ἡ λαϊκὴ τέχνη τῆς Κρήτης. 3) Ὑφαντικὴ καὶ βαφικὴ.

Knowles: P. F. Knowles, Safflower-Production, Processing and Utilization, Economic Botany 9, 1955, 273—99.

Myrtos: P. Warren, Myrtos. An Early Bronze Age Settlement in Crete, 1972.

Olivier: J-P. Olivier, Les scribes de Cnossos, 1967.

PM: Sir Arthur Evans, The Palace of Minos at Knossos I—IV, 1921—35.

Polunin: O. Polunin, Flowers of Europe. A Field Guide., 1969.

Polunin and Huxley: O. Polunin and A. Huxley, Flowers of the Mediterranean, 1965.

Rechinger: K. H. Rechinger, Flora Aegaea (= Akad. Wiss. Wien. Math.-Nat. Klasse. Denkschriften 105, 1, 1943, 1—924).

Rechinger, Neue Beiträge: K. H. Rechinger, Neue Beiträge zur Flora von Kreta, Akad. Wiss. Wien. Math.-Nat. Klasse. Denkschriften 105, 2, 1, 1943, 1—184.

Trevor-Battye: A. Trevor-Battye, Camping in Crete, 1913.

Watt: Sir G. Watt, The Commercial Products of India, 1908.

Wylock: M. Wylock, Les aromates dans les tablettes Ge de Mycènes, Studi Micenei ed Egeo-Anatolici 15, 1972, 105—46.

# I. *po-ni-ki-jo* tablets

The tablets in which *po-ni-ki-jo* is recorded are written in two hands only, 136 and 137<sup>1</sup>. Those in hand 136 are concerned with *po-ni-ki-jo* and coriander, while those in hand 137 deal with *po-ni-ki-jo* alone.

Hand 137. In the Ga series 992, 1020, 1021, 1040, 5736 and possibly 8438 are in hand 137. Except for 5736 they follow a formula:

ethnic/*po-ni-ki-jo* + *a-pu-do-si* + M

followed by a number (though none of the figures has survived). In the B series, of which five tablets, 810, 813, 817, 818 and 5584, are in hand 137, B 5584 has the formula

*po-ni-ki-jo* + *a-pu-do-si* + VIR + M

and B 818 is probably of the same type. Ga 5736 may possibly belong to this group also<sup>2</sup>, but the figure 30 here may refer to major units and not men, though the coincidence of VIR 30 on B 818 and 5584 is remarkable. All these tablets may have commenced with a place-name or ethnic denoting the origin of the *a-pu-do-si*, though there is no evidence in the text for this, and it is not impossible that groups of thirty men had a significance, clear to the scribes but obscure to us, which enabled them to be identified without further description.

The other three tablets in hand 137, B 810, B 813 and B 817, are all fragmentary and no references either to *po-ni-ki-jo* or to the M unit of weight have survived. In the case of B 817 a recent join<sup>3</sup> has given a reading:

*to-so/ku-su-to-ro-qa* VIR 32[      */ko-wo, di*[

in which the mention of *ko-wo* leads to the suspicion that 817 is not part of the same functional group as the rest<sup>4</sup> and this might perhaps also be true of B 810 and 813.

Hand 136. There are two types of tablet mentioning *po-ni-ki-jo* in hand 136. The larger group, exemplified by Ga 424, 425, 426 and 427, usually begins with an ethnic or proper name followed by *a-pu-do-si* and *po-ni-ki-jo* (either on the same line or one above the other) and the unit

<sup>1</sup> Olivier 82—3

<sup>2</sup> L. Godart, *Les tablettes du scribe 137*, *L'Antiquité Classique*, 1970, 835 and n. 3

<sup>3</sup> Godart and Olivier, 119 *raccords et quasi-raccords de fragments dans les tablettes de Knossos*, *SMEA* 15, 1972, 34

<sup>4</sup> Godart and Olivier (see note 3) make this suggestion.

sign *M* plus a number. Ga 420, 1335, 7286, 7425, 7426, 7429, 7431, 7446<sup>5</sup> and 8439 are probably of the same type. The other group consists of three tablets only, 417, 418 and 423. These record *po-ni-ki-jo* and coriander, with entries of the type

ethnic or place-name		<i>po-ni-ki-jo</i>	<i>M</i>
		<i>ko-ri-ja-do-no</i>	AROM

There is also a unique tablet, Ga 834, in hand 136:

]*po-ni-ki-jo*, *ko-no-si-ja* *M* 34[

This does not fit either of the above two groups for several reasons. The ethnic comes after the commodity; it is feminine, whereas all the others are masculine; and the amount of *po-ni-ki-jo* is larger than any other except those of Ga 7446 and perhaps Ga 5736 (see note 5). There is no mention of *a-pu-do-si*, and while this might have been lost, it is equally possible that we have here a record of a delivery of *po-ni-ki-jo* to a woman at Knossos, made by the palace either as a ration or for some manufacturing process.

The find-places of the tablets, as far as they are known, are as follows<sup>6</sup>: tablets in hand 137 come from area I3 (Area of the Bull Relief), tablets in hand 136 dealing with both *po-ni-ki-jo* and coriander and with *po-ni-ki-jo* alone come from E5 (Corridor of the House Tablets and near the Entrance to the East Pillar Room), except for Ga 1335, which comes from J1 (East-West Corridor)<sup>7</sup>.

The amounts recorded on the tablets are generally quite small. A number of them are clearly records of *a-pu-do-si* to the palace. Some, for example Ga 427 and 7431, show a deficit, *o-pe-ro*. In the B set groups of men rather than the whole community are apparently paying *a-pu-do-si* (for example B 818, B 5584, if one assumes that the men do not themselves form part of the *a-pu-do-si*, which does not seem likely). The reason for such a payment is obscure; these men might be specially wealthy, and therefore liable to extra 'taxation', or perhaps they had a

<sup>5</sup> Ga 7446 has a very large amount of *po-ni-ki-jo* (41 *M* 2) and may therefore be a totalling tablet of some kind, or may even not record *po-ni-ki-jo* at all, but some other substance. Similarly, if the ideogram VIR is not restored on Ga 5736, as Godart suggests (see note 2), the amount of *po-ni-ki-jo* involved is disproportionately large, and the tablet may not in fact refer to *po-ni-ki-jo* at all.

<sup>6</sup> Olivier 22—4

<sup>7</sup> It may also be relevant to mention the find places of tablets in hand 136 which record *po-ni-ki-jo* alone. Ga 415, 416, 419, 421 and 428 come from E5, Ga 34 from F2 (Magazine III), Ga 422 from G2 (Room East of the Gallery of the Jewel Fresco) and Ga 673 from F15 (Corridor of the Stone Jambs).

large supply of a particular commodity needed by the palace and were required to send it in addition to the community contribution<sup>8</sup>. It is interesting that the amount apparently provided by thirty men on B 818 (M 6 N 2) is greater than that given by a whole community (*qa-mo* M 5 on Ga 417) or by an individual presumably representing the community (*su-ri-mi-jo* M 3 on Ga 418).

*po-ni-ki-jo* is recorded as coming from *qa-mo* (Ga 417), *su-ri-mo* (Ga 418), *qa-ra* (Ga 423), \*56-*ko-we* (Ga 424 and ? Ga 1040), *da-wo* (Ga 427) and *pu-so* (Ga 992). Coriander, the appearance of which with *po-ni-ki-jo* on some tablets seems to suggest that the two substances are found in similar localities, comes from *pu-na-so* (Ga 34), *ru-ki-to* (Ga 415) and *ku-ta-to* (Ga 419). Few if any of these places can be identified with any conviction.

*qa-mo* is associated with *u-ta-no* on Dn 5559 and E 749. The latter is not likely to be Itanos in East Crete, but may be fairly close to Knossos. It appears from Fp 13 to have had a religious link with Knossos. This may be significant, since the only other community<sup>9</sup> mentioned in the Fp (1) set is Amnisos, which is known to be near Knossos. *su-ri-mo* is linked with *qa-mo* and *u-ta-no* (on E 749 and Og 833 respectively) and also with *ti-ri-to* on E 749. The theory that both *su-ri-mo* and *qa-mo* are near Knossos is supported if *ti-ri-to* is to be connected with Knossos itself, as Chadwick has suggested<sup>10</sup>.

*qa-ra* appears twice next to *ru-ki-to* (Λύττος) on E 749 and V 865, and once each with *ti-ri-to* and *tu-ri-so* (Τύλισος) on Dn 5015 and Og 833. Again a position in the north of the island, not far from Knossos, is indicated.

\*56-*ko-we* is associated on C 902 with *wa-to* and *o-du-ru-wo* and on G 820 with *ku-do-ni-ja*, probably situated at modern Khania in the west. This suggests a West Cretan location for \*56-*ko-we*. It is also related to several other places, none of which can be placed on the map with any certainty.

<sup>8</sup> There may be a similar process recorded on An 657, where there is a record of thirty men from *ku-pa-ri-so* who are described as *ke-ki-de*. They presumably represent the contributions of the district. See Documents<sup>2</sup> 470.

<sup>9</sup> With the exception, that is, of obscure places such as *au-ri-mo* and \*47-*da*, which do not occur outside the Fp(1) set and are probably isolated and uninhabited shrines or sanctuaries.

<sup>10</sup> Chadwick 44

*da-wo* has close links with *pa-i-to* (Φαιστός) on Dn 1094, Le 641 and Og 180, and it seems likely that it should be placed in the Mesara. However, it is also associated (on Ce 59 and X 1538) with *ku-ta-to*, which may have been located at Κύταιον, perhaps Aghia Pelaghia on the north-west corner of the bay of Herakleion<sup>11</sup>.

*pu-so* is twice associated with *ru-ki-to* (on Dn 5318 and Og 833) and with *u-ta-no* (on As 604 and E 749). It may also be connected on As 604.3 with *wi-na-to* (= Inatos on the south coast), but the place-name between them has been lost. In the same way *pu-na-so* may be linked with *da-wo* on Ga 1530, but another place-name probably stood between the two. Otherwise its links are with *ra-ja*, which is itself very obscure.

The connexions of *ru-ki-to* have already been mentioned. It is linked twice with *pu-so* (Dn 5318 and Og 833), twice with *tu-ri-so* (E 668 and Og 833), twice with *qa-ra* (E 749 and V 865) and twice with *ti-ri-to* (E 749 and V 159). Even were it not almost certainly to be identified with Lyttos these connexions would point to a location somewhere in the north of the island.

To sum up: such evidence as there is indicates that the communities providing *po-ni-ki-jo* are, with the exception of *da-wo*, likely to be situated in Northern Crete, and probably at no great distance from the palace at Knossos.

*po-ni-ki-jo* is generally assumed to have been a spice<sup>12</sup> because it is recorded principally in the Ga series, which deals with aromatic substances (coriander, cyperus and others). However, the possible associations of the series with Fh and Gg<sup>13</sup> suggest that these three groups represent the records of a department concerned with the raw materials (oils and spices) for the manufacture of unguents and also with minor agricultural activities such as the production of honey<sup>14</sup>. It seems possible therefore that *po-ni-ki-jo* need not be an aromatic, but some other substance used in unguent production, or even something not related to unguents at all. It may be significant that the tablets recording *po-ni-ki-jo* alone (hand 137) were found in a different area from the bulk of the Ga

<sup>11</sup> Chadwick 43. But for the more plausible location of Κύταιον at Palaikastro, some kilometres south of Aghia Pelaghia (this latter site being Apollonia-Panormos) see now Alexiou, *Kretika Khronika KZ'*, 1974, 32—53.

<sup>12</sup> Documents<sup>2</sup> 222 and Glossary. Palmer, *The Interpretation of Mycenaean Greek Texts* 1963, 277 and Glossary

<sup>13</sup> See Godart, *ku-pi-ri-jo* dans les textes mycéniens, *SMEA* 5, 1968, 56—70

<sup>14</sup> Olivier 125. For a recent and interesting study of Minoan production of aromatic substances see H. Georgiou, *Aromatics in Antiquity and in Minoan Crete: A Review and Reassessment*, *Kretika Khronika KE'*, 1973, 441—56. For the botanical approach to Mycenaean aromatics see Wylock 105—46.

series (including the records of *po-ni-ki-jo* + coriander), namely I 3, Area of the Bull Relief. Perhaps *po-ni-ki-jo* had a dual use and could be employed both by the 'unguent department' and in some other way, so that records of it were also kept in another department.

Its association with coriander may suggest that *po-ni-ki-jo* too is a plant or plant product, and that the two are found growing together. Because it is measured by weight rather than by volume like the other spices it is not likely to be a small seed or a powder, but rather something for which a capacity measure would give an inaccurate measurement; roots, bark or dried seed-heads might be possible candidates, or even some sort of mineral product, though the relation with coriander may make this unlikely. The fairly small quantities of *po-ni-ki-jo* which are recorded, in comparison with the large amounts of coriander (for example M 5 = 5 kg. on Ga 417, but AROM 1 = 96 litres of coriander), may suggest that it was a lightweight substance, but large in bulk, which seems likely for a plant product. It may be significant that the only surviving evidence for its distribution is Ga 834, where a large amount of *po-ni-ki-jo* is apparently being given to an unknown number of Knossian women. Purely local distribution to women only may indicate that the substance is not an ordinary food ration, but is intended for use in a manufacturing process; however, since other tablets of a similar function may have been lost, this *e silentio* argument cannot be a strong one. Some other tablets in the Ga series are likely to be records of the distribution of spices for processing rather than for consumption, if only on the ground that the amounts involved are so large. But, unless we know what *po-ni-ki-jo* is, it is impossible to say whether the amounts of it recorded are large or not in terms of the substance itself. For example, a fixed unit of weight such as M would provide a small quantity of flour but a very large quantity of saffron.

## II. *po-ni-ki-jo* not dates

Our discussion thus far enables us next to review a recent interpretative study by J. Melena<sup>15</sup>. He proposes that *po-ni-ki-jo* is a foodstuff, namely dates (cf. Greek φοινίκια) issued as rations, and he rightly draws attention to the frequent depiction of the date-palm in Minoan art<sup>16</sup>. The theory may however be faced with strong objections.

<sup>15</sup> J. Melena, *po-ni-ki-jo* in the Knossos Ga tablets, *Minos* 13, 1974, 77—84.

<sup>16</sup> PMI 253—4 and fig. 190; II 493. P. Pelagatti, *Kret. Khron.* IE'—IEŦ, 1961—2, A' 105—8 and pls Z' 2, 4; H'; Θ'; I'. M. Möbius (*Jahrbuch* 48 (1933) 15—6 and fig. 9)

First, the amount suggested by Melena as an approximate total of payments recorded by hand 136 in the Ga series is  $\pm$  M 85, that is  $\pm$  85 kgs, while the individual quantities recorded normally amount to 3—5 kgs. This seems a remarkably small amount even as a small percentage of the date crop of several communities, when one considers that the average annual yield of a date-palm is about 45 kgs<sup>17</sup>, nor would the ration Melena suggests<sup>18</sup>,  $\frac{1}{4}$  kg per man, last more than two or three days at the most and as such seems hardly worth recording.

Secondly, an interesting feature of the representations of date-palms in Minoan art was long ago pointed out by Evans<sup>19</sup>, namely the painting by Minoan artists of the inflorescence springing up from the central stem, but never of the ripened fruit. Now it happens that wild date-palms still exist in a few localities in Crete and have been studied in detail by W. Greuter. They all seem to be the Cretan endemic *Phoenix Theophrasti* Greuter<sup>20</sup>. This is in all probability the palm depicted by the Minoans (cf. note 16). The fruit does not properly form and remains inedible (caryotae haud edules, vix carnosae, Greuter), as was the case in Minoan times according to the representation (and the complete absence so far of date-stones from Minoan or Aegean Bronze Age settlements). This does not prove that dates in Crete *never* ripened to a point where they became edible<sup>21</sup>, but it does suggest that conditions of soil and climate do not seem to have been suitable for the production of dates on a regular basis, nor in amounts sufficient to provide a regular contribution to the diets of palace dependants. On the positive side the

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discusses the representations and the wild palms botanically and identifies them in detail as *Phoenix dactylifera* L. But, as Möbius notes, *P. dactylifera* is not native to Crete, and for Greuter's new identification and definition see below, Note 20

<sup>17</sup> J. Renfrew, *Palaeoethnobotany* 1973, 152

<sup>18</sup> Melena, op. cit. 63. The tablet in question, B. 818, is clearly a record of *a-pu-do-si*, payment to the palace, so that quite apart from the numerical difficulty interpretation as a ration seems ruled out.

<sup>19</sup> PM II 493

<sup>20</sup> W. Greuter, *Beiträge zur Flora der Südägäis* 8—9, *Bauhinia. Zeitschrift der Basler Botanischen Gesellschaft* 3, 1967, 243—50. For the occurrence of these palms along the south coast of Crete see Hood and Warren, *BSA* 61, 1966, 181, 184 and pl. 39a, and Greuter, op. cit. 247. The best known stands are at Vai on the north eastern tip of the island, while a few near Gazi, west of Herakleion, also seem to be of the same type (Greuter, op. cit. 247, referring to earlier workers). For an illustration of the Gazi-Almyro palms three hundred years ago see M. Boschini, *Il Regno tutto di Candia*, 1651, pl. 21, where they appear in the bottom corner. For Belon's description, published in 1555, see below, note 22.

<sup>21</sup> PM II 493 note 2, where Evans suggests that representations of dates on coins of the south Cretan city of Priansos show the fruit ripe. For references to the fruit of *cultivated* palms (*P. dactylifera*) see Greuter, op. cit. 246.

parallelism between Minoan representations and modern growth provides the most specific evidence that the climate of Bronze Age Crete cannot have been very different from the enviable one of today, not so hot that dates ripened to edibility, yet warm enough for palm-trees and their inflorescence<sup>22</sup>. This evidence for climate concurs with the general picture of Bronze Age agricultural prosperity based on viticulture, the olive and cereals, which can have developed only in a climate similar to that of Cretan agriculture today<sup>23</sup>.

### III. *po-ni-ki-jo* and red dye substances

But *po-ni-ki-jo* is clearly a native Cretan substance (and definitely not an import), measured by weight, not a foodstuff, but probably a plant or product of a plant and possibly, though with less likelihood, some kind of mineral product. Let us take the generally accepted view that our word is related to φοινικ-words in Greek and apply the basic meaning of φοιν-words, which is red (see Appendix I). Let us then consider some possibilities for a substance producing or consisting of red colour.

One source for red colouring matter was ochre, red iron earth, which, like haematitic red iron earths, occurs abundantly in Crete and was used for red paint on Minoan plasters and vases<sup>24</sup>. But ochre is the ancient

<sup>22</sup> This point was partially seen by Evans, PM II 493, but fully made by B. Aiginetes in an excellent study on the stability of the Cretan and Aegean climate through time: Τὸ κλίμα τῆς Κρήτης καὶ ὁ σταθερότης τοῦ κλίματος τῆς Ἑλλάδος ἀπὸ τῶν μινωϊκῶν χρόνων, Πραγματεῖαι τῆς Ἀκαδημίας Ἀθηνῶν 18 (1954) no. 3, pp. 1—46, especially pp. 35—6 and figs. 2—6. For the argument that although there have been minor fluctuations no major changes have occurred in the Greek climate from c. 7000 B. C. to the present day see J. R. A. Greig and J. Turner, Journal of Archaeological Science 1, 1974, 193, with references.

But the unsuitability of the Cretan climate for fruiting palms was noticed long ago by the observant Belon: Il y a quelques endroits en Crete où croissent les palmiers, tant grands que petits; et principalement le long d'un rivage ou ruisseau, qui sort d'une fontaine en abîme d'eau salée, que les Cretes nomment en leur vulgaire Almîro. Mais ilz ne portent aucun fruit; Car le climat de Crete est trop froid pour les palmiers, Pierre Belon, Les Observations de plusieurs singularitez et choses memorables, trouuées en Grece, Asie, Iudée, Egypte, Arabie, & autres pays estranges (Paris 1553) p. 7 verso.

<sup>23</sup> On the climate of Crete see L. G. Allbaugh, Crete. A Case Study of an Underdeveloped Area 1953, 43—5, 467—9, and for areas related to archaeological sites Aiginetes, op. cit. (note 22), M. Wagstaff in Myrtos 267—82, Rackham in Myrtos 284—6, and Warren and Tzedhakis, BSA 69, 1974, 303—5

<sup>24</sup> P. Faure, Revue Archéologique 1966, 62 note 4, 71. Myrtos 240. Cameron in Myrtos 306, 313. W. Noll, L. Born and R. Holm, Naturwissenschaften 61, 1974, 361—2. PM I 534.



μίλτος, which appears to be distinguished from *po-ni-ki-jo* in Linear B (*po-ni-ki-jo* on Sd 4409.b, *mi-to-we-sa* on Sd 4415.b)<sup>25</sup>, this suggesting two distinct shades of red colour in the decoration of chariots.

The red dye called cochineal is produced from several insects, one of which is *Kermococcus vermilio*, which lives as a parasite on the Kermes oak, *Quercus coccifera* L.<sup>26</sup> This tree is found in Crete and in the Selakanos region above Malles is of high antiquity<sup>27</sup>. It may well have existed in the Bronze Age and cochineal have been produced from its insect. But *po-ni-ki-jo* as cochineal is difficult. The insect is only the size of a grain and in antiquity was as much believed to have been a seed as an insect<sup>28</sup>. It is unlikely to have been measured by weight, as *po-ni-ki-jo* was, being better suited as a 'seed' to a capacity measure.

Another relevant tree is the terebinth or turpentine tree, *Pistacia terebinthus* L., well known in the Mediterranean<sup>29</sup>. It is not uncommon in Crete<sup>30</sup>, where it has the popular name ἀντραμιθιά<sup>31</sup>, probably from τέρμινθος. According to Polunin<sup>32</sup> apart from the sweet-smelling gum from the sap, Chian turpentine, the berries are edible, the seeds produce an oil and large, horn-like galls commonly formed on the leaves by an aphid produce a red dye. With so many advantages the tree might well have been used by the Minoans and so all the more interesting and plausible is a suggestion of Melena that *ki-ta-no* may be this tree or a product of it, since Hesychius has kritanos as a variant name of the tree<sup>33</sup>. However, if the suggestion is accepted, *po-ni-ki-jo* could not in consequence be red dye from this source.

<sup>25</sup> Cf. Documents<sup>2</sup> 367 and Chantraine 10—1

<sup>26</sup> Forbes 100—4

<sup>27</sup> P. de Tournefort, Relation d'un Voyage au Levant 1717, I 49. Rackham in Myrtos 290. For its presence on ground below 500 feet see Trevor-Battye 278. For the use of the insect for red dye until quite recently in Crete and elsewhere see Apostolake 96, 98 and for its recent use in Tsakonia see Th. Kostake, 'Υφαντικές ὕλες καὶ ἐπεξεργασία τους στὴν Τσακωνία, Πελοποννησιακά Ε', 1962, 271 and note 4. For its use in Crete see also Frangaki (1969) 28, quoting Belon on the collection of the insects, and Frangaki (1974) 87, 93—4, also giving the popular name of the tree in the island, κατσοπρίνι (prickly oak, cf. σκατζόχοιρος (\*κατσόχοιρος), demotic for ἀκανθόχοιρος, prickly pig, i.e. hedgehog), and of the insect, πρινοκόκκι or κιρμίζο (which is presumably from Kermes).

<sup>28</sup> Dioscorides, de Mat. Med. IV 48. Theophrastos, Περὶ φυτῶν ἱστορίας III 16. Pliny, Nat. Hist. IX 141; XVI 33; XXII 3. Forbes 103—4, 142 note 17

<sup>29</sup> Polunin and Huxley 119. Polunin 232 and pl. 69

<sup>30</sup> Trevor-Battye 268, 276

<sup>31</sup> Frangaki (1969) 49

<sup>32</sup> Polunin 232

A further possibility is red dye from the murex shell, *Murex trunculus* L., *Murex brandaris* or *Thais haemastoma* L., the source of the famous crimson-to-purple dye of Tyre<sup>34</sup>. Heaps of murex shells with Middle Minoan sherds were noted by Bosanquet at Palaikastro and on Kouphonisi island off South-Eastern Crete<sup>35</sup> and more recently were found in some quantity in the Minoan settlement on Kythera<sup>36</sup>. It seems clear that the Minoans produced crimson and purple dye from this marine source. For an equation with *po-ni-ki-jo* we may note the suitability of shells for the recorded weight total,  $\pm 85$  kgs., and perhaps the restricted number of localities associated with *po-ni-ki-jo*. We may imagine the production of this form of dye to have been concentrated at a few specialist centres<sup>37</sup>. But, although the interpretation cannot be definitely excluded, there are several substantial difficulties. One is that we cannot prove any of the associated place-names on the tablets to have been a coastal community. Second, purple dye from murex is πορφύρα in Greek and for that there is the Mycenaean word *po-pu-re-ja*, quite distinct from *po-ni-ki-jo*<sup>38</sup>. Third, we have seen from the tablets that it would not be easy for *po-ni-ki-jo* to be other than a plant or product of a plant, the substance being associated with coriander. Ochrous or haematitic earths, or Kermes insects, being terrestrial, are not entirely inconceivable, but murex shells would seem in most incongruous juxtaposition with a spice.

Orchil is a violet, purple or red dye obtained from various lichens, such as *Roccella tinctoria*, *Lecanora tartarea*, *Roccella fucoides* and *Rytiphloea tinctoria*<sup>39</sup>. They were common on rocks on Eastern Mediterranean coastlines and Pliny<sup>40</sup> wrote of phykos growing on rocks round Crete, used for dye, the most approved kind growing on the northern side of the island. His phykos must have been one of the lichens, probably

<sup>33</sup> J.L. Melena, KI-TA-NO en las tablas de Cnoso, *Darius* 2 (1974) 45—55, with appended typescript 'Consideraciones suplementarias sobre la planta KI-TA-NO'. We are grateful to Dr Chadwick for a copy of this appendix.

<sup>34</sup> Forbes 112—9. Apostolake 80—94

<sup>35</sup> Bosanquet, JHS 24 (1904) 321. PM IV 111 and note 5

<sup>36</sup> J.N. Coldstream and G.L. Huxley, Kythera. Excavations and Studies 1972, 36—7, 282 and pl. 3e

<sup>37</sup> For production in Crete in Classical times see Herodotus IV 151.

<sup>38</sup> Chantraine 11

<sup>39</sup> Forbes 101, 108. For *R. fucoides* (Neck.) Wain. see Rechinger 21 and for *R. fucoides* (Dicks.) Vain. see Rackham in Myrtos 297. For *Rytiphloea tinctoria*, Apostolake 99—100 (with references). See also Rechinger 8 for its occurrence on Rhodes and the northern Sporades

<sup>40</sup> Pliny, Nat. Hist. XIII 48, 136. Theophrastos, Περὶ φυτῶν ιστορίας IV 6 5

*Rytiphloea tinctoria* or *Rocella fucoides*, which latter Rechinger recorded on the larger island of Paximadhia off southern Crete and which Rackham noted is now rare<sup>41</sup>. But red dye was made from lichen on Amorgos, where *Rytiphloea tinctoria* is abundant, into the first half of the nineteenth century; although the dye is now unknown there it is still used in Cyprus for painting eggs red at Easter<sup>42</sup>. Pliny's recording of the use of the litmus lichen for dye in Crete in Greek and Roman times is interesting and shows that it could have been available for the Minoans much earlier<sup>43</sup>. The plant would more likely have been measured by weight rather than capacity, although a plant or product of littoral origin is perhaps strange alongside coriander.

Alkanet and madder are each red dyes, the former extracted from the root of dyer's alkanet, *Alkanna tinctoria* (L.) Tausch. (formerly *Anchusa tinctoria* L.)<sup>44</sup>, the latter from the root of dyer's madder, *Rubia tinctorum* L.<sup>45</sup>. The blue-flowered dyer's alkanet is common throughout Crete<sup>46</sup> and dyer's madder has been recorded in the island at Arkadhi (nome of Rethymno) and at Asmari in the Pedhiadha<sup>47</sup>. Dye from the

<sup>41</sup> See note 39

<sup>42</sup> Apostolake 99 and note 4, 100. For a discussion of the modern manufacture, mainly that in Britain, of red and purple dyes from lichens see D. Richardson, *The Vanishing Lichens* 1975, 80—9

<sup>43</sup> Lichen was used in Egypt in the Middle Kingdom in association with cosmetic and aromatic substances and in the later New Kingdom as packing for the abdomens of mummies. See the valuable and thorough discussion by Merrillees in R. S. Merrillees and J. Winter, *Miscellanea Wilbouriana* (Brooklyn Museum, New York) 1 (1972) 111—2. The lichen from the mummies was identified as *Parmelia surfuracea*. Now this plant is absent from contemporary Egyptian flora, but is present in the Aegean, including Crete (Rechinger 45, Rechinger, *Neue Beiträge* 41). It might therefore have been exported as an aromatic substance from Crete to Egypt in Middle to Late Minoan times. But this is no more than speculation since, although the plant very probably grew in Minoan times (a lichen is an unlikely plant to have been deliberately introduced to Crete), it has not yet been found in Minoan contexts.

<sup>44</sup> Forbes 108. Polunin and Huxley 151 and pl. 14 no. 388. Polunin 336 and pl. 103. For the formal description of the plant see *Flora Europaea* 3, 1972, 96.

<sup>45</sup> Forbes 106—7. Dioscorides, *de Mat. Med.* III 160. Pliny, *Nat. Hist.* XIX 47—8

<sup>46</sup> Rechinger 451, recorded at Khania: Cape Maleka and Perivolía; Sphakia: Frangokastello and Komitadhes; A. Vasilios: Sellia (Rechinger writes "Sulia", which is probably a slip for Sellia; there seems to be no village called Sulia (or Soulia)); Herakleion ("Kandia"). It is also found in the Aegean islands generally (*ibid.*). The subspecies var. *Lehmanni* Tin. is also recorded in Crete, between Skaloti and Rhodhakino (A. Vasilios-Sphakia border), and above A. Galene (*ibid.*). Seeds of alkanet, an anchusa (species not determinable) have recently been found in the Palaeolithic levels in the Franchthi Cave in Greece. See J. Renfrew, *Hesperia* 42, 1973, 66.

<sup>47</sup> Rechinger 582

latter plant was still made in Crete until recently<sup>48</sup> and alkanet used for colouring ointments and make-up<sup>49</sup>. The roots of either plant would not be incompatible with the weights recorded in the tablets. The existence of both plants in north central Crete and the fact that some of the places associated with *po-ni-ki-jo* appear to be in the region of Knossos is interesting.

A fourth relevant plant is safflower, *Carthamus tinctorius* L., the florets of which yield a yellow dye, bastard saffron<sup>50</sup>, and yet another red one, carthamin<sup>51</sup>. Safflower is a kind of large thistle and each plant produces a number of yellow florets. The plant appears to be a native of or originally cultivated from a wild form (*Carthamus oxyacanthus* Bieb.) in Asia<sup>52</sup>, has been cultivated in central and southern Europe and in Africa (from as early as the XIIth Dynasty in Egypt, see note<sup>50</sup>), on the island of Zakynthos<sup>53</sup>, and is said to occur along the Mediterranean coasts<sup>54</sup>. Wherever it occurs it is regarded as an escapee from former cultivation. It does not however appear to have been recorded for the Aegean, although many other species of *carthamus* have been<sup>55</sup>. But this need not mean that it is or has been absent, only that it has not been

<sup>48</sup> Apostolake 104—6. Frangaki (1969) 174—5. Frangaki (1974) 93—4. The popular names for the plant in Crete are ριζάρι or ἀγριοριζάρι, and the technical name ἐρυθρόζανον.

<sup>49</sup> Apostolake 104—6

<sup>50</sup> Hesychius refers to the yellow colour: κνηκόν τό κροκίζον χρώμα, ἀπό τοῦ ἄνθοῦς· ὅτε δὲ ἀπὸ κάρπου, τὸ λευκόν (and under κνήκος· λευκός· καὶ εἶδος τι σπέρματος· καὶ πυρρός).

The dye has been identified on Egyptian XIIth Dynasty mummy wrappings (Rawlinson, History of Egypt I, 1881, 62—3. Hübner, Journal of the Society of Dyers and Colorists 25, 1904, 223—6. Hübner in M. A. Murray, The Tomb of the Two Brothers 1910, 72—9, especially 76. Mell, Textile Colorist 1932, 97—9

<sup>51</sup> For the production of carthamin in India in the 19th century see the detailed account in Watt 278—80. For the dyes Forbes 121.

<sup>52</sup> G. Hegi, Illustrierte Flora von Mittel-Europa, München 1902, VI 986 sq.: Heimat mit großer Wahrscheinlichkeit im Orient (Kleinasien bis Vorderindien) zu suchen ist und als deren Wildform vielleicht *C. oxyacanthus* Bieb. angesprochen werden darf. We are grateful to Dr. Oliver Rackham for this reference and for that to Boissier in note 53. For the distribution and modern use of safflower (for the oil of its seeds) see Knowles 273—99, especially 273, 294. For its occurrence in southern Europe, Polunin 463.

<sup>53</sup> E. Boissier, Flora orientalis, sive enumeratio plantarum in Oriente a Graecia et Aegypto ad Indiae fines, Lugduni 1875: Hab. in Aegypto, Assyria, Persia, Zakyntho ubi colitur, hinc inde inquilinus factus, ex India? Abyssinia? oriundus.

<sup>54</sup> Knowles 273: but he gives no details of location.

<sup>55</sup> Rechinger 669—71 lists 11 species and varieties, including *lanatus*, *Creticus*, *Boissieri*, *leucocaulos*, *ruber*, *coeruleus*, *coeruleus* var. *dentatus* and *coeruleus* var. *incisus* in Crete. For *dentatus* var. *ambiguus* widely in Crete, Rechinger, Neue Beiträge 153.

looked for or has been left unrecorded as not being truly wild. The occurrence in Zakynthos and the existence of a wide variety of popular names (ἀγριοζαφάρανα, ἀσφοῦρι, ζαφάρανα, σαφλόρι (presumably from safflower), σαφράνι, ψευτοζαφορά) referring to the plant, ἀτρακτυλὶς ἢ βαφικὴ in technical Greek<sup>56</sup>, suggest that it has been well known in Greece, presumably as an escapee of former cultivation.

The more important product of the flower, the red dye carthamin, was in common use until the last century, when it was replaced by cheaper synthetic and aniline dyes, although it is still used in India to dye special garments such as wedding clothes. The florets could also be used to colour food, especially soups, and as a cosmetic colourant. The seeds yield an oil which is used in cooking in the Near East and also plays an important part in some diets, as it is low in cholesterol. Watt records that the average yield in India was 80 lbs of dried flowers an acre and that the range of yields was 80 to 120 lbs<sup>57</sup>, which would have been 36 to 55 kgs. To produce the dye the first stage is to pick the florets from the flower heads. They are then dried, ground to powder and added to water. This solution is treated with soda to release the dye and then with acid to dissolve the the yellow pigment, leaving the carthamin behind. (To obtain a yellow dye an alkaline such as fuller's earth is used to dissolve the carthamin<sup>58</sup>).

We have seen that *Carthamus tinctorius* seems to have been widely known in Greece. When it was first introduced is unknown. But the Classical Greek κνήκος, Doric κνᾱκος, is normally taken to have been safflower and so therefore is *ka-na-ko*, which is one of the plants in the spice tablets (Ge series) at Mycenae<sup>59</sup>. Moreover it is there described as *re-u-ka* and *e-ru-ta-ra*, of which the former is measured by capacity and the latter by weight. Seeds would be measured by capacity, flower heads

<sup>56</sup> Apostolake 108 and note 6, with reference to Θ. Χελδραῖχ — Σπ. Μηλιαράκης, Τὰ δημῶδη ὀνόματα τῶν φυτῶν προσδιοριζόμενα ἐπιστημονικῶς (Athens 1910) 53. See also Μεγάλη Ἑλληνικὴ Ἑγκυκλοπαιδεῖα under ἀτρακτυλὶς. There is no doubt that ἀτρακτυλὶς ἢ βαφικὴ refers to *Carthamus tinctorius* and ἀτρακτυλὶς with other species names to other species of carthamus. But the modern Greek term may also include the genus *Atractylis*, both because of the Greek term itself and because the Μεγάλη Ἑλληνικὴ Ἑγκυκλοπαιδεῖα calls ἀτρακτυλὶς ἢ δικτυωτὴ *Carthamus cancellata*, present in Greece, which is incorrect and should be *Atractylis cancellata* (see Polunin and Huxley 189 and Polunin 454).

That the modern ἀτρακτυλὶς ἢ βαφικὴ/*Carthamus tinctorius* is the ancient κνήκος seems clear from Pliny, Nat. Hist. XXI 184, cneco sive atractylide, . . . Aegyptia herba.

<sup>57</sup> Watt 279

<sup>58</sup> Watt 278—80. Knowles 294. Forbes 121

<sup>59</sup> Documents<sup>2</sup> 226

could well be suited to measurement by weight and red, *e-ru-ta-ra*, safflower would be the red colouring substance therefrom<sup>60</sup>. The tablet records would thus agree well with Hesychius's description (see note 50), white colour (*re-u-ka*, λευκόν) from the seeds, dye colours from the flower heads, Hesychius naming the more common yellow (κροκίζον χρώμα), the tablets the less common, but equally efficacious and useful red (*e-ru-ta-ra*, ἐρυθρά).

Against such an argument M. Wylock, in a long and valuable article, has recently raised objections<sup>61</sup>. He considers that since there is no evidence for *Carthamus tinctorius* in Greece, nor for its ancient usage (contrast Egypt), κνῆκος and *ka-na-ko* very doubtfully refer to it and almost certainly referred to a much wider range of species, both of *carthamus* and similar plants. This is indeed possible. It may be that one of the wild species was used by the Mycenaeans or the later Greeks, while the cultivated form, with a higher dye content, came in and was used later, and was called safflower (κνῆκος) because of its resemblance to the wild form known earlier by the same name<sup>62</sup>. But we should still have some species, presumably of *carthamus*, called safflower (*ka-na-ko*), known already in the Bronze Age, while the evidence of its popular names in Greece, cited above, suggests that *Carthamus tinctorius* itself may have a long history in the Aegean. All in all the evidence, botanical and linguistic, is at least as good for the identification as *Carthamus tinctorius* of *ka-na-ko*/κνῆκος as it is for its identification as some other species of *carthamus* (see Appendix II).

Another point made by Wylock is that *ka-na-ko*/κνῆκος was almost certainly not used for colouring substances but, as in modern times, for the oil from its seeds<sup>63</sup>. This latter usage is again possible, especially within the context of other spices on the Mycenae tablets. But this usage need not have been the only one and the argument for *e-ru-ta-ra* referring to a red colouring substance or function is still a reasonable one.

<sup>60</sup> Production of red dye from the florets is noted by Ventris and Chadwick, Documents<sup>2</sup> 226, in the context of *ka-na-ko*. See also Chadwick in *The Mycenae Tablets II*, ed. E.L. Bennett (1958) 107.

<sup>61</sup> Wylock 118—25

<sup>62</sup> We thank Dr Rackham for suggesting this point. As a possible analogy he points out that various wild species of *Chenopodium* eaten by Tollund Man were replaced in Medieval times by *Chenopodium Bonus Henricus*, which still exists as a relic of its former cultivation.

<sup>63</sup> Wylock 125

From this necessarily involved discussion these alternatives remain plausible: either that, since many wild species of *carthamus* are found in Crete and the Aegean, one of them might well have been used for dye, or that, since *Carthamus tinctorius* is known to have been cultivated in Middle Kingdom Egypt (see note 50), it was also cultivated in Crete and the Aegean or had already escaped to and was thus naturalized and used in the latter regions by the same date.

#### IV. *po-ni-ki-jo* and *ka-na-ko*

We may now go on to ask, could *ka-na-ko* and *po-ni-ki-jo* be one and the same substance? The case against this thesis can be put as follows: although *ka-na-ko* is not recorded at Knossos this might well be due to the accidental loss of the relevant tablets; since other spices known at Mycenae, for example cumin, are not found at Knossos either, though it is unlikely they were not used there. So, if *ka-na-ko* was referred to at Knossos, would the Mycenaeans there really have had two words for the same substance? Second, if the term *ka-na-ko* was in fact unknown at Knossos, would the Mycenaeans have had one word for safflower there (*po-ni-ki-jo*) and another at Mycenae? Why not call safflower *ka-na-ko* at Knossos?

On the other hand *ka-na-ko* and *po-ni-ki-jo* are each measured by weight and though a large number of flower heads would be needed estimated amounts for the recorded weight totals present no problem<sup>64</sup>. The average consignment of *po-ni-ki-jo* at Knossos is about M 5 (5 kgs.), of *ka-na-ko* at Mycenae M 2. But the differences between the amounts of coriander at Knossos and Mycenae are much more marked than this, so that the discrepancy in amounts between *ka-na-ko* and *po-ni-ki-jo* is hardly a problem.

Now cultivated safflower in India is grown in alternate rows with some other plant, often vetch or chickpeas<sup>65</sup>. Is this perhaps an ex-

<sup>64</sup> Let us allow 5 flower heads to an ounce. (Since they are, thistle flower heads there are unlikely to have been *more* per ounce). Five kgs would then require the harvesting of 880 flower heads!, an easily obtainable amount in thistley Crete. Eighty-five kgs would require about 15,000 heads, a cartload. Moreover, if we bear in mind the average yield in India (above p. 52), 80 lbs (36 kgs) an acre, the amount of land involved if safflower were cultivated, rather than simply gathered from what had escaped to the wild, might be as little as two to three acres.

The apparent distribution of M 34 (34 kgs) to a woman or women at Knossos (Ga 834) might have been for the purpose of extracting the dye.

<sup>65</sup> Watt 279. Knowles 274

planation of the connexion between *po-ni-ki-jo* and coriander? The distribution of the findplaces in the palace of the sets in hands 136 and 137 (above, p. 42) may be partly explained by this identification; *po-ni-ki-jo* is not a spice, but is treated as one by the people who supply it to the palace, and in some instances is recorded on the same tablets as a true spice, coriander. Possibly a small proportion of the substance was in fact used as a food colourant, and in this case the spice 'department' would be responsible for the records. However, if the chief use of *po-ni-ki-jo* was as a dye, one might also expect to find it recorded outside the spice 'department', and this is perhaps why the group in hand 137, that is, those which record *po-ni-ki-jo* alone, are found in a different area of the palace (I3, Area of the Bull Relief).

If this then were the case, that *po-ni-ki-jo* and *ka-na-ko* were both red safflower dye, the Mycenaeans would have taken up the word they found in use for safflower when they reached Knossos, *po-ni-ki-jo*. It would then seem plausible that the root of the word, the origin of which is unknown, is in a Minoan word used in general as an adjective for red and specifically, in technical usage, for the dye and the plant which produced it. The Mycenaeans at some point adopted the word, but not, on the mainland, in its technical sense, since for this they soon came to use their own word, *ka-na-ko*. This might possibly be related to the Sanskrit *kāñcana-*, gold (cf. the colour of safflower), or have been borrowed from a New Eastern word for safflower. One would indeed expect a different word for red dye or its plant in the Minoan and Mycenaean languages.

## V. Traditional red dye substances in the Aegean

One other approach to the question of red dye may be briefly considered. Among the most impressive aspects of rural life in the Aegean is the degree of continuity in village crafts and industries. The making of pottery, especially of pithoi, metal-working, agricultural operations<sup>66</sup>, particularly olive farming, readily come to mind. Spinning and weaving, the manufacture of coloured textiles and cloths on wooden looms, may certainly be added. The Knossos tablets give evidence of an extensive

<sup>66</sup> For an excellent collection of recent photographs of agriculture and crafts in Greece, in which the simplest tools and equipment, often wooden, are still in use, see D. Theokhares, *Neolithic Greece*, National Bank of Greece 1973, pls 150—65, 170—2.



wool industry and manufacture of textiles<sup>67</sup>, and there is ample evidence from frescoes that Minoan women wore elaborately woven, brightly coloured dresses. The colours for these can only have come from natural dyes, prepared from the island's rich flora. We have considered the plants available for red dye and Anna Apostolake, in her valuable study<sup>68</sup>, has shown that these plants not only were existing and used for dyes in Greek and Roman times, but were actually still employed in Cretan and Greek villages until recent times, when synthetic dyes came to replace them. The craft has probably been in continuous practice since at least the Classical period. This does not of course demonstrate Bronze Age use of the specific red and other dye plants (and we note Merrillees's warning against the uncritical use of modern botanical evidence<sup>69</sup>). Nevertheless the coloured dresses of the Minoan ladies show that many natural dyes were used and, given that the plants were available, it would be no surprise at all if the Cretan tradition extended back well beyond its known twenty-five centuries.

## VI. Conclusion

We have not of course proved that *po-ni-ki-jo* in Linear B means red or red dye or a red dye plant, since we began by taking the meaning red from  $\phi\omicron\iota\nu$ -, and we can adduce scarcely any compelling, independent evidence for *po-ni-ki-jo*, apart from the chariot decoration (above p. 48). For example remains or seeds of coriander or some other substance have not been found together or in adjacent vessels. Nevertheless the application of the meaning red does make good sense in the relevant tablets, including those concerned with chariot decoration. When one gives botanical consideration to the rich flora of Crete it is apparent that a number of very suitable plants for producing red colouring matter are available and have been used, probably continuously, at least since

<sup>67</sup> J. T. Killen, The Wool Industry of Crete in the Late Bronze Age, BSA 59, 1964, 1—15. Documents<sup>2</sup> 201—5, 313—21. For the extent of the textile industry in the island see Chadwick 40—5.

<sup>68</sup> Apostolake 71—124. For the modern or relatively recent use of dye plants see Apostolake 99—122 *passim* and for the use of vegetable dyes from ten different plants (including the Kermes insect!) in the villages of Tsakonia see Kostake (*op. cit.* note 27) 270—2. For dyeing in Crete in 1596 *cf.* Fynes Moryson's remark that the island "hath great plentie . . . of all coloured Dyings" (quoted in Warren, *Kretika Khronika* ΚΔ, 1972, 70. For traditional dye plants and the dyeing process in Crete see the two most useful studies by Evangelia Frangaki (1969, 1974).

<sup>69</sup> Merrillees and Winter (*op. cit.* note 43) 111

Classical antiquity. Dyer's alkanet, dyer's madder, litmus lichen and safflower, producing alkanet, madder, orchil and carthamin, are the obvious possibilities for *po-ni-ki-jo*, and cochineal from the Kermes oak insect should be included. All can be supported; much can be said for alkanet and madder, since both are from plants occurring throughout Crete and madder has traditionally been much used for dyeing. We are inclined to favour safflower because it seems to be so clearly evidenced at Mycenae as actually used by the Mycenaeans. But that choice depends on the arguable *po-ni-ki-jo/ka-na-ko* equation and perhaps involves a botanical problem. We conclude by suggesting that *po-ni-ki-jo* as red or red dye, whatever the plant, makes good sense linguistically and botanically and affords us an intriguing glimpse into one aspect of the Cretan Bronze Age economy, the world of the Minoan dyer<sup>70</sup>.

#### Appendix I—On φοιν- signifying red

Chadwick and Baumbach (*Glotta* 41 (1963) 255) state that "the absence of the labio-velar in Mycenaean shows that these forms [*po-ni-ki*] have no connexion with φοινός". But this statement seems possible only on the assumption that φοινός is derived from or connected with the labio-velar word φόνος, which, as Dr Chadwick observes to us, would appear as *qo-n-* in Mycenaean. We are grateful to Professor N. E. Collinge for explaining to us that in their early stages the two words are, *prima facie*, unconnected. Φοινός first occurs in Homer (*Iliad* XVI 159), where cheeks are red from eating bloody meat. There is no suggestion of slaughter. In the Homeric Hymn to Apollo there is some overlapping of meanings ('breathing out his red spirit', line 362), and finally the red and slaughter ideas come together in the hybrid φοίνιος, found only from Pindar and Aeschylus onwards. Apart from the argument from the history of the two words Professor Collinge also points out to us that, while φόνιος will be a normal and abiding form in Ionic, \*φονυος might be a metrical variant, but could only appear as \*φοῖνος, not φοινός with apparent accent shift. This then is further evidence for the absence of connexion between the two words. *Cf.* also Chantraine 9 note 10.

<sup>70</sup> We are most grateful to Dr J. Chadwick and Professor R. F. Willetts for reading this article in draft. Among helpful suggestions owed to Chadwick was his raising of the problem discussed at the beginning of Appendix I. We also feel it right to point out that Chadwick still holds that the context of *po-ni-ki-jo* on the tablets points firmly in the direction of a culinary spice or a perfume and against a dye, while we have argued that at least in the case of safflower these several uses are not mutually exclusive.

Thus in Mycenaean φοινός and φόνος would have been distinct and there is no labio-velar barrier between *po-n-* and φοινός. Thus *po-ni-ki-* words are not debarred from meaning red. That there are good grounds for actually proposing a red meaning can be seen from the contrast between two kinds of (red) chariot decoration (see p. 48).

Further, with regard to meaning red in Greek Chantraine points out the relationship between φοινός (and δαφοινός) and Φοίνικες and from this suggests that Φοίνικες originally meant «les gens à la peau hâlée» (Chantraine 8—9), comparing the forms Αἰθίκες from αἰθός and Φαίακες from φαίός. But the same meaning for Φοίνικες had already been suggested on other grounds many years ago by both Fick, *Vorgriechische Ortsnamen* 123—4, and Evans, *PM I* 9, independently.

It was from the ethnic, Phoenicians, that the famous Tyrian purple was named, Chantraine argued, they being the suppliers *par excellence* of the dye. So too the towns called Phoenix on the south coast of Crete (M. Guarducci, *Inscriptiones Creticae* II (1939) 192, 226—9. Hood and Warren, *BSA* 61 (1966) 184 and n. 71. Greuter, *op. cit.* (note 20) 247) could have been named after Phoenician landing points in their westward movements or could mean places where there were palms, since the palms are found near at least one such place (Hood and Warren, *op. cit.* 181, 184 and pl. 39a. Greuter, *ibid.*). But palms do not lead us back to Melena's theory, since either of the two meanings for the name of those towns would itself have been secondary, that is either taken from the already derived name of the people ('red-men' (Evans), *les gens à la peau hâlée* (Chantraine)) or from the trees, themselves named from the same people, as Chantraine notes (*op. cit.* 7).

It is of interest to observe that the same basic meaning, red, has recently been argued for ποινικάζεν (to paint red letters) on the Spensithios decree from Crete. Jeffery and Morpurgo-Davies, in their brilliant editio princeps, mentioned but did not accept this meaning (*Kadmos* 9, 1970, 133). It has since been argued independently by Chantraine (*op. cit.* 12—4) and Willetts (*Kadmos* 11, 1972, 97). Chantraine, *op. cit.* 12, also concluded that φοιν-/po-ni-ki-jo is purple or red, other than murex, but did not develop the point in relation to *po-ni-ki-jo*. The same point had already been made for *po-ni-ki-jo* by Ventris and Chadwick (*Documents*<sup>2</sup> 367) and in relation to the φοινίκη γράμματα of Herodotus by Mylonas (*Τὰ φοινίκη γράμματα τοῦ Κάδμου, Πραγματεῖαι τῆς Ἀκαδημίας Ἀθηνῶν* 23 (1959) no. 5 pp. 1—33, especially p. 27). Although G.P. and R.B. Edwards argue strongly against the red meaning for ποινικάζεν, taking the writing words to be

derived from the ethnic Phoenician (Kadmos 13, 1974, 48—57), yet they do not deny the evident antiquity of the red meaning itself.

After our article was written Dr Ruth Edwards kindly sent us xeroxed pages of her forthcoming book, *Greek Legends and the Mycenaean Age*, with special Reference to Oriental Elements in the Legend of Kadmos, Hakkert, Amsterdam, in which she argues both for the root meaning of φοινίκ- as red and that Phoinikes might well have once included the Minoans, not because they were Redskins, but because they were workers in purple and red dye (see chapter 5, with its notes 86—95). See also R.B. Edwards, *Some Traditional Links between Crete and Boeotia*, *Teiresias*, June 1972, 2—5, especially p. 4, arguing on grounds different from the older views of H. R. Hall and Sir John Myres, themselves taking up Fick and Evans (see above).

## Appendix II—On thistledown

Wylock also argues (118 note 74) against the identification with safflower because of the distinction made in the tablets between red and white; safflower could not be called red, while the logical distinction would be between flowers of two different colours and not, as Chadwick proposed, between two things different in kind, like seed and flower. But the latter distinction, involving colours, was precisely that made by Hesychius (see note 50), although in any case a logical distinction between seed and flower on such a plant, where the thistledown stuff of seed time might seem like a second flowering or the same flowers at a different stage, might not have struck the Mycenaean mind with the same force as it does ours.

We may add that Wylock's rejection of *ka-na-ko* as *C. tinctorius* does not really get him very far, since none of the thistle-type plants he suggests as alternative appears useful for food, condiments or colouring substances, whereas he himself has a magnificent list of all the uses to which *C. tinctorius* can be put (Wylock 121—3), and which would justify the Mycenaeans growing it.

Wylock's own suggestion, that a passage in Theophrastos (*Περὶ φυτῶν ἱστορίας* VI 4 5) means that a species of wild carthamus was used for making thread for weaving ("fils de tissage") is highly problematical, since there appears to be no textual justification for this rendering. The manuscripts have either σπληνίοις (M Ald) or σπληνείοις (U) which, according to LSJ, is a linen pad or compress (in Hippocrates).

Both the Loeb and Teubner texts accept the emendation *πηνίοις* (distaffs), *πηνίοις ἔνιαι τῶν ἀρχαίων ἐχρῶντο γυναικῶν*, which is difficult to understand (how could a thistle be used for a distaff?) and in any case could hardly mean “fils de tissage”. If *σπληνίοις* is in fact correct we may suppose that thistledown could be used as padding for a compress, but hardly ‘neat’, on a wound. As to the possibility that, regardless of the reading, thistledown could be spun or woven (“fils de tissage”), it is hard to imagine and would in any case have produced a most fragile and impracticable thread, and surely only if there was no other source available. But the Mycenaean of course spun from flax and wool in abundance. Furthermore the amounts of *ka-na-ko* at Mycenae are so small that they would have been quite insufficient for producing enough thistledown for any such purpose as weaving.