# ΠΕΠΡΑΓΜΕΝΑ

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# Monastiraki, in the Amari region of Crete: some interim archaeobotanical insights into Middle Bronze Age subsistence

## Introduction

Monastiraki lies in the valley of Amari, on the natural route leading from northern Crete to the Messara plain. Excavations have brought to light a centre of the "Protopalatial" period which spans from MM I to MM IIB (2000–1700 B.C.).[1] It seems to have been destroyed mainly by fire following an earthquake (Kanta – Marazzi 2006: 31). The large number of storerooms and the existence of three (3) archives with thousands of clay sealings and seal impressions indicate that Mona-

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1 We should keep these dates in mind when we see the high degree of wine production at Monastiraki as we note an increasing importance of this product in MM IA. Although wine presses have been identified as early as the Early Minoan period (Kopaka – Platon 1993: 68-69), they increase in the MM and become abundant in the Late Minoan period. For the role of wine in the dialectics of power see Hamilakis (1996: 24) who believes that systematic wine production started in the first palace period and for depictions of wine processing in artefacts and art for the Minoan period see Kopaka 2002. Suffice it to say that the most commonly mentioned commodity in Linear A documents of Phaistos was wine (Weingarten 1994: note 2) and Palmer (1994: 29) dates these five texts to the MM II.

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stiraki was a nodal site with palatial characteristics[2] and must have controlled various types of t r a n s a c t i o n s . Some of these transactions have left no tangible evidence, except for bio-archaeological remains, which are presently under study.[3]

The centrally planned layout of Monastiraki is impressive (Kanta 1999: 387) as well as its location on a low hill over the valley of the river Platys facilitated the control of the route from north to south and vice versa. The site itself stretches over c. 30 ha. / 300 sq. m. (Kanta – Marazzi 2006; Kanta *et al.*, in press).

Other finds such as a model of a shrine, fragments of a second model, and a group of 2 figurines, unique in Minoan archaeology, presented at the Potnia conference (Kanta – Tzigounaki 2000), suggest there must have been, as well, a religious centre in the area.

## Excavations

The site was first excavated illegally during the Second World War by German archaeologists in the German army (Kirsten 1951) (Fig.1). The present excavations started in 1980 under the direction of Professor Athanasia Kanta.

The East Sector of the excavation, which is the larger part of the complex that has been uncovered, is part of a large building complex comprising more than 97 rooms, but it has not, yet, been totally, to date, excavated. The ground floors seem to have been storerooms and workshops, whereas on the first floor were habitation and adminis-

2 The hierarchical position of the site is marked by monumental architecture, the great number of sealings, many storerooms and workshops. The reconstructed shrine model was found with one of the archives. Fragments of another shrine was unearthed in another area of the site. A feature which marks the nodal character of Monastiraki is also the ramp connecting the North to the South, leading from the country-side to the archive building (Kanta *et al.*, in press).

3 The sealings of the Pylos Wine Magazine (Palmer 1994: 194) provides evidence that the bureaucracy drew upon a large number of landholders. The sealing system of receipts supplements the records of the transactions by showing who had fulfilled his obligation to the palace. It seems that for personal business, impressed nodules were used for receipts and may have served as the main type of record for a landholder.


Fig. 1 : *Monastiraki: Topographical map of the site with its three (3) sectors: the Greek, the Italian and the German*

trative rooms. One of the possible three archives seems to have been kept, most probably, on the first floor above rooms 57, 67, 68. The northern edge, although not well preserved indicates open air areas and areas dedicated to cooking (Kanta in press p.19) (See the open air oven).

## Pottery

Aspects connected to the pottery of Monastiraki have already been published (Kanta – Marazzi 2006; Kanta *et al.*, in press; Kanta 1999). At Monastiraki and at Phaistos there seems to have been, on the one hand, a multitude of storage areas and storage vessels and, on the other, many shapes which, probably, refer to their use as having contained liquids. Common pottery types, except for the pithoi are carinated cups, jugs, amphorae, askoid jars and conical cups.

## The methodology

From 1982 and up to the present, some judgment soil samples were collected for bio-archaeological remains. A major problem, which does not only touch upon Monastiraki, but is relevant to many sites,[4] is the long period of time that soil samples are stored in plastic bags after being excavated and before being water-floated. One serious outcome was the destruction of tags and, therefore, the loss of valuable information. Other samples, collected in the 1980's and not water-floated had been attacked by rodents, so the plastic bags were split open and there was no possibility of knowing their contexts. However, in subsequent years a large number of soil samples have been collected and floated.

Briefly, the final aim of the study is to provide information concerning the following points. However, at present, due to the little space available here, data is only presented which will touch, mostly, upon the problem of wine and wine making at the site.

a) To provide an idea of the plants cultivated and/or used;
b) To get an idea of their distribution in the various rooms;
c) To also get an idea of the "micro-distribution" for each pot (an example is from room 38);
d) To distinguish between products brought in and those cultivated near the site;
e) To contribute towards the discussion on whether Monastiraki was mainly a producer site and/or a consumer one;

4 It is, mainly, humidity which produces moulds over wooden tags, whereas paper ones (yes, some excavators include these) get torn with obvious results. The best solution, we believe, is to have plastic tags and the information written with waterproof pens (Edding have been noted by the author as being much more resistant to all weathering than Faber-Caster) — we have made a small experiment leaving plastic tags written with black Edding and another with black Faber-Caster on a tree exposed to all weather (rain, sun, wind etc.) and the result was spectacular: the writing with the Edding pen survived fairly vividly, whereas the other was terribly faint and nearly illegible. This plastic tag, for extra safety, could be placed within a small, dry, plastic bag and put with the soil sample.

f) To contribute towards understanding food preparation and consumption as well as other technologies related to plant use, such as food preservation, plants used in perfumery, textile and dyeing/mordanting.

## Storage

*The Eastern Sector.* As the pottery is still under study, here we tried to do some preliminary estimates of the possible storage areas of the Eastern Sector, in order to have an impression of the role of storage, of this site. For this exercise, we defined as a storeroom, rooms which had three (3) or more pithoi and in cases where rooms were small, rooms with two (2) pithoi were also included. We have, therefore, reached the conclusion, so far, that this Sector has at least 17 rooms which should be described as storage rooms *per se* (Figs 2 & 3). On the whole, some 88 (minimum number) pithoi have been found in the Eastern Sector.

*Sector of the old excavations and New Greek excavations. German Sector and New Greek excavations.* A list of rooms considered to have been storage rooms have been noted here too (Figs 4 & 5). Some 34 pithoi have been unearthed, to date, in the German Sector. In Room II, grape seeds preserved in high density were interpreted by the excavator (Kirsten 1951: 45) as remains of raisins, possibly being fermented to make a sweet dessert wine.

*Sector of Greek-Italian survey work and New Greek excavations* (Fig. 6). Room 1 has been excavated where 2 pithoi have been found but most of the other rooms remain unexcavated down to floor level.

In brief, for all of the three sectors, 123 pithoi have been found at Monastiraki so far, which refers to a *minimum number* (M.N.), as the pithoi in rooms with under 2 jars have not been included in this count.

## The archaeobotany

Only a part of the archaeobotanical material is presented here. Another section is, presently, under study by Girolamo Fiorentino

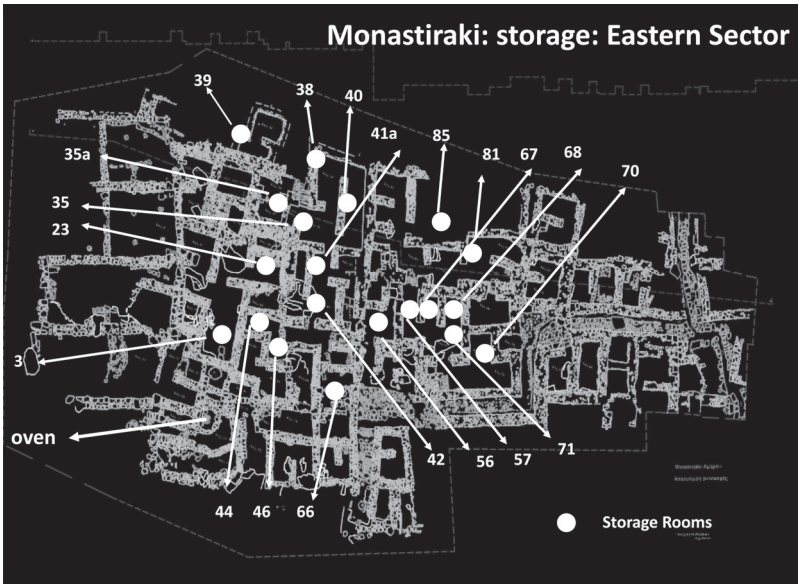


Fig. 2 : *Map of rooms in the Eastern Sector which have been defined as storage rooms*

- ✓ **Room 3 = 4 pithoi**
- ✓ **Room 23 = 2 pithoi & figurines**
- ✓ **Room 35a = 3 pithoi**
- ✓ **Room 35 = 12 pithoi**
- ✓ **Room 38 = 12 pithoi**
- ✓ **Room 39a = 3 pithoi (at least)**
- ✓ **Room 40 = at least 4 pithoi**
- ❖ **Room 41 = 45 loomweights, grinding tools & 1 pithos**
- ✓ **Room 41a = 5 pithoi**
- ✓ **Room 42 = 2 pithoi**
- ✓ **Room 44 = 5 pithoi**
- ✓ **Room 46 = 2 pithoi**
- ✓ **Room 56 & 57 = 8 pithoi**
- ✓ **Room 66 = 6 pithoi**
- ❖ **Room 67 = 1 pithos & sealings**
- ✓ **Room 68 = 2 pithoi (K)??**
- ✓ **Room 70 = 10 pithoi**
- ✓ **Room 71 = lots of pithoi ???**
- ❖ **Room 81 = 1 pithos & sealings**
- ✓ **Room 85 = 5 pithoi**

Fig. 3 : *List of storage rooms in the Eastern Sector which have been defined as storage (Storage rooms = N 17)*

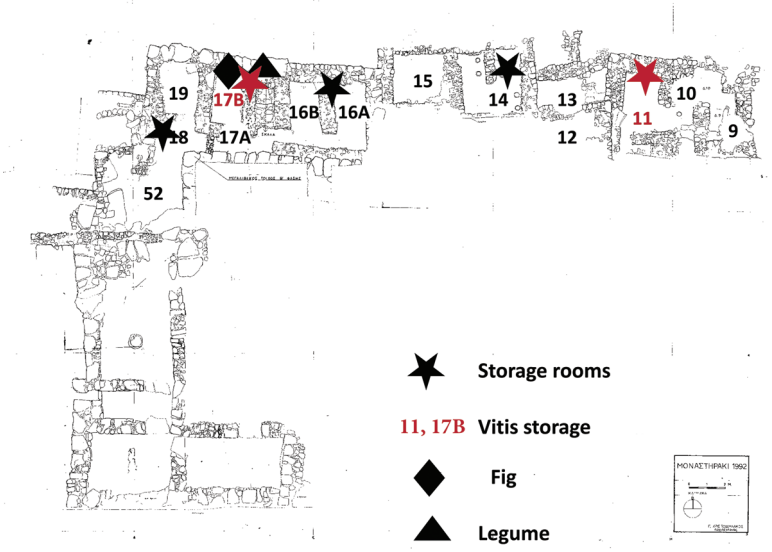


Fig. 4 : *Map of rooms in the German & New Greek Sector which have been defined as storage rooms*

- **Room 11 = 4-5 pithoi**
- **Room 14 = 10 pithoi**
- **Room 16A = 5 pithoi**
- **Room 16B = 5 pithoi**
- **Room 17 B = 5 pithoi**
- **Room 18 = 4 pithoi**

Fig. 5 : *List of storage rooms in Greek-Italian survey work and New Greek excavations (Storage rooms N=6)*

and Francesca Solinas[5] (Kanta – Marazzi 2007).

Although we have to take into consideration that the results discussed in this paper represent only a part of the samples and are, therefore, not fully portraying the whole, such as the complete

5 Both are staff of the University of Suor Orsola Benincasa at Naples.

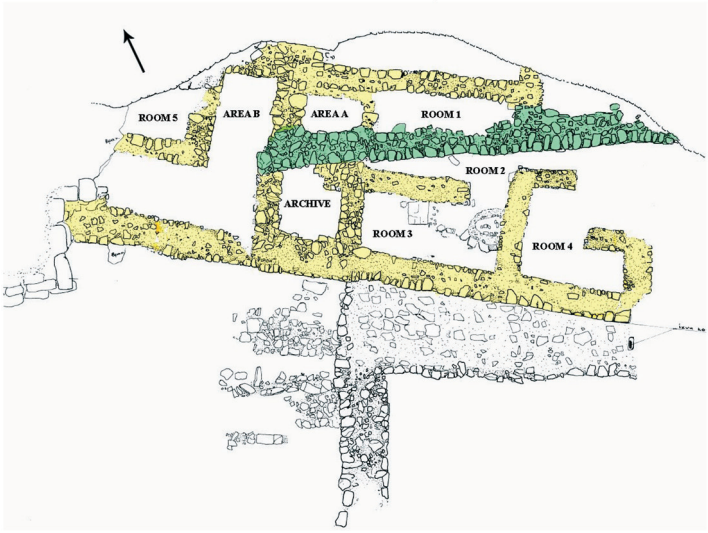


Fig. 6 : *Sector of Greek-Italian survey work and New Greek excs.*

archaeobotanical system of Monastiraki, yet the samples have been, fairly, randomly chosen and, definitely, not picked for the obvious wealth of botanical parts.

Monastiraki presents us with a wide spectrum of cereals and legumes (Figs 7 & 8). So far, only hulled ***Hordeum vulgare*** (barley) has been identified and we, definitely, have six-row barley. Two-row might also be included but we need more thorough study in order to come to some secure conclusion. Wheat (***Triticum***) was also present, and einkorn (***T.monococcum L.***), probably emmer (***T.sp. cf. dicoccum***) and bread wheat (***T. aestivo-compactum***) are also included. However, the quantities are not as great as one would have expected for such a site. It is, of course, possible that the cereal storerooms have not yet been excavated.

Legumes, on the other hand, are more numerous than cereals and include ***Vicia faba*** (horsebean), ***Pisum sativum*** (peas), ***Cicer arietinum*** (chick-pea), ***Lathyrus cicera/L.sativus*** (dwarf chickling), ***Lath-***

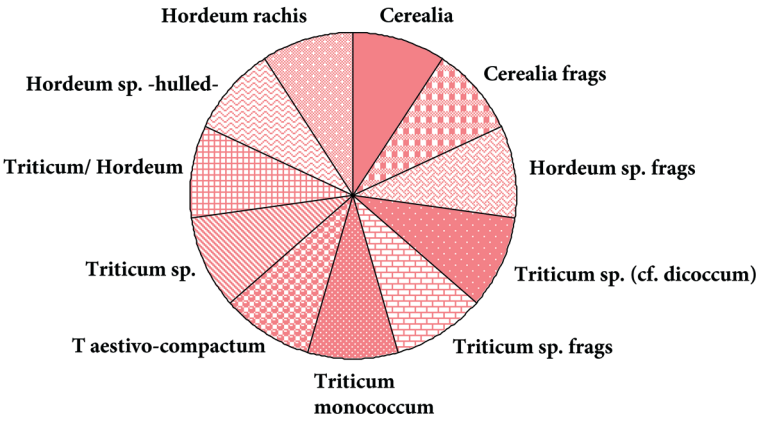


Fig. 7 : *Cereal parts and species represented*

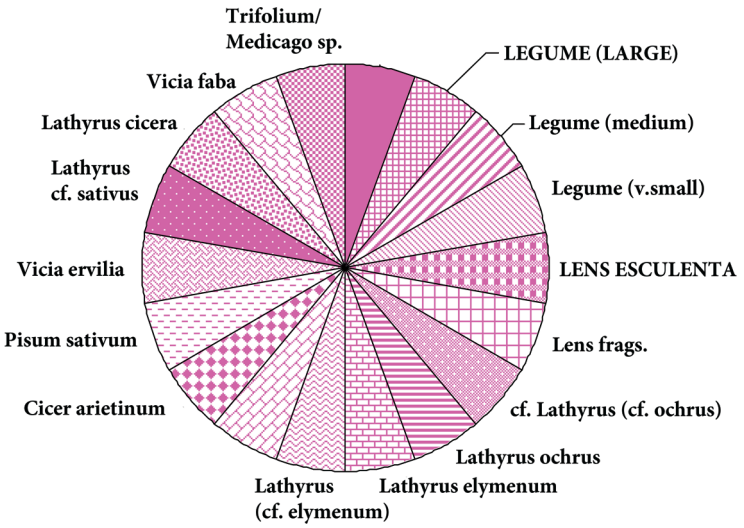


Fig. 8 : *Legumes identified*

***yrus clymenum*** (spanish vetchling), ***Lathyrus ochrus*** (cyprus vetch), ***Vicia cf. sativa*** (common vetch), Legumes (large, small and medium, unidentified), ***Vicia ervilia*** (bitter vetch), ***Trifolium/Medicago sp.*** (clover) and ***Lens esculenta*** (lentil). As they do not deplete the soil, but are often used for manuring it, they could be expected to have grown amongst vines and other fruit trees.

Olive stones (***Olea europaea L.)*** and/or fragments are found in remarkably poor numbers. We cannot, of course, deny the possibility that the olive was mainly stored as oil and would, therefore, have left no archaeobotanical evidence. Had it been, somewhat, processed in the area, one would have expected though olive fragments. Contrary to our findings, olive wood seems to have been quite common, as the preliminary charcoal study has shown (Kanta – Marazzi 2006: 123). On the other hand, Chamalevri in the North, another site of, exactly, the same period but not of the same nature, has provided a high presence of olive fragments. This in itself needs further clarification and interpretation. An important point worth investigating could be that we are already seeing sites which specialize in some types of crops and have their own agenda for cultivation.

Other fruit trees are also present such as the fig (***Ficus carica***), (Fig. 9) the almond (***Prunus amygdalus***), and pomegranate (***Punica granatum***).

The cultivation of the vine (***Vitis vinifera L.***) was, obviously, at Monastiraki of paramount importance and there is no inkling of doubt that this was n o t a product of import (Fig. 10). It is impossible to tell the cultivation method of the viticulture, that is if they were cultivated in fields on their own or whether planted between some trees, for there is evidence from Linear B (Palmer 1994: 57ff) that vines, in certain areas, could have been cultivated in between trees and the vines themselves could have been left to climb on these fruit trees, as they do in the wild state. The high presence of fig (***Ficus carica***) might also point to what Palmer identified as the term *we-je-we* (KN Gv 863.2 & PY Er 880.5), which, perhaps, indicates the training of vines up trees and practiced by Mycenaean vine growers

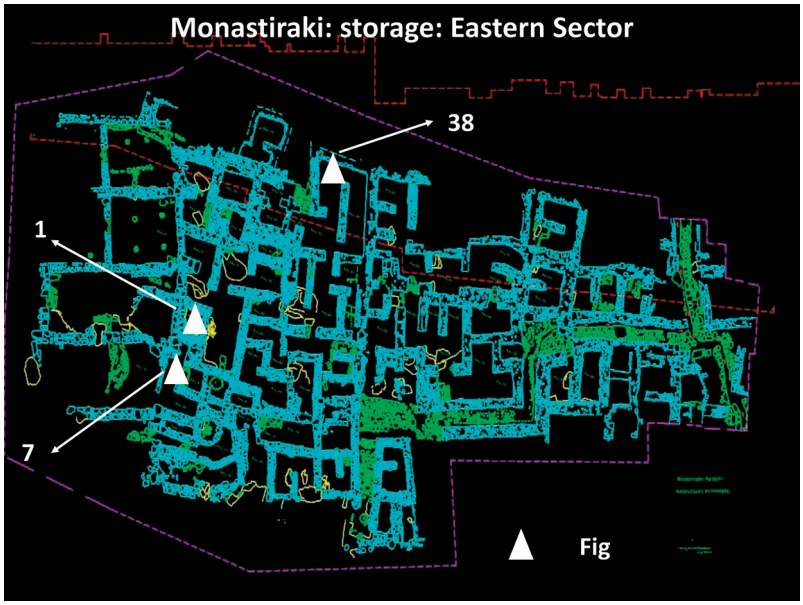


Fig. 9 : *Distribution of charred (Ficus carica) figs*

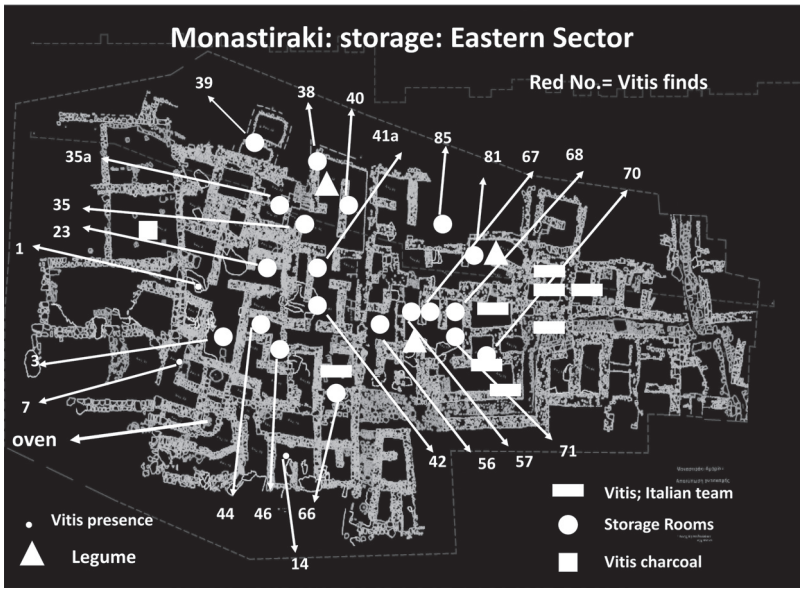


Fig. 10 : *Distribution of grape (Vitis sp.) and legume finds in the Eastern Sector of Monastiraki*

(Palmer 1994: 59-60). Is it also such a case for Monastiraki?[6] At this stage, there is no way of verifying it.

Eventually, we ought to be able to identify various products of the vine. Apart from its use as a f r u i t (summer and autumn) which was surely very important in prehistoric societies, its ability to be stored for, at least, a year, when dried, must have been a blessing and an important source of calorific intake. Its d r i e d form would have been consumed as a dessert and a calorie "booster" in the cold days of winter. All bruised drupes could have been used for three products: a) wine b) πετιμέζι (grape **molassa**)[7], and c) **vinegar**. Two of the products have not been given their potential credit when prehistoric economy is discussed, especially as they are both easily manufactured products. The process of making grape **molasses** is very simple and it would have involved the boiling of grape juice and/or must to the point when the liquid fraction would have evaporated and become very concentrated.

**Vinegar** is also done very simply, by leaving grapes to stand in a pot for some time, until the juice turn acid through oxidation of the alcohol content to acetic acid, by the activity of bacteria (Singer *et al.* 1975: 275). Its use would have been of excessive importance to macerate some foods and preserve them, for long periods of time. This extension of shelf life would have been of paramount importance in long term storage of food stuffs, especially greens which had a short life span; it would have also contributed enormously to the trade of, otherwise, "short-lived" food-stuffs. Nonetheless, it would have facilitated long sea and land voyages, where processed food would have been *a sine qua non*.

6 It is true that on Crete, contrary to other windy areas of Greece, traditionally vines were trailed on posts which could be 1m. or even higher off the ground.

7 It is a syrup which could have been used for sweetening, especially for the poorer section of the population, instead of honey, which would have been much more valuable. With this concentrated syrup, one would think, sweet wines would have been produced, a type of 'Port wine', which could keep and travel much longer. This would have been very important, if wine was a circulating/ cash commodity, which it must have been, to a large extent.


Fig. 11 : *Monastiraki: archaeobotanical material. (Photos) Must: the dregs which are the pips, stalks (pediciles), grape skins, immature pips*

One of the most important preparations of the vine, would have been, of course, **wine-making**, which would have been one of the main purposes of grape cultivation. Luckily, at Monastiraki evidence of wine-making has been indicated by the finding of must (grapes, skins and stems) in some pithoi[8] (Fig. 11). Archaeobotanical evidence of wine-making is rather, rarely, detected, as the dregs, at some stage, would have been sifted out, after the filling of the pithoi with the must. However, at Monastiraki, in many cases, we seem to be finding the dregs. The interpretation is somewhat fraught with dangers in that, the destruction layer could, simply, be interpreted as representing the time of wine-making, which is September for the south of Greece.[9] We cannot deny that this might have been the case.

8 It is interesting to note that the only possible inscription found at Monastiraki was found on a pithos sealing where the sign has been interpreted as an ideogram for wine (Hallager 2002: 65; note 19). This is a strong evidence which connects pithoi to wine.

9 The exact time is changeable as it depends on the weather of a particular year, in

Nevertheless, it is important to say that, at least, we know that even the first stages of fermentation were spent in the pithoi[10] and not in other containers. If that is the case, it could have been possible for the dregs to be sifted out, all at once. Another interpretation of the archaeobotanical finds could also demonstrate that dregs were not sieved, when the wine was stored but only just before its consumption, in a piece-meal fashion. This, perhaps, was a way of making the tannins dilute better in the mixture, for reasons which need to be investigated further and, also, a way of making sure that wine would be coloured a, rather, deep red.

Both grape molassa and vinegar must have been of utmost importance in Bronze Age society, not only due to their value as food additives and taste enhancers, but both, in different ways, as preservatives. In Prehistoric societies, just as in all societies, there was a major need to promote the life-expectancy of foods and their contribution, in this field, must have been paramount. On the one hand, grape molassa (petimezi) for preserving fruit and sweet meals and, on the other, vinegar for preserving vegetables, meats/fish and dairy products; both would have caused a revolution in food availability and shelf-expectancy.

The use of wine is also very important to several crafts and amongst them **perfumery**[11] and **dyeing**.

## Perfumery and dyeing[12]

From Theophrastus, Dioscorides and Pliny [13] we know that for certain

as much as this has effects on the ripening stages of the grape.

10 This agrees well with Palmer (1994: 16).

11 There is a clear mention of wine connected to perfumery in PY Un267 (Palmer 1998: 190).

12 The connection of wine with textiles is indirectly seen in four nodules in Pylos, nodules Wr 1359 and 1360 (Palmer 1998: 193-94), inscribed with the wine ideogram and these have been identified as the product of two scribes who normally worked together in a textile workshop. Surely that indicates something which needs interpretation.

13 Theophrastus, *De Odoribus*; Dioscorides, *Materia Medica*, Book I; Pliny, *Historia Naturae*, Book 13.

perfumes, the herbs used for stypsis are chopped and soaked first in wine in order to help soften the aromatic herbs for further ingestion into the oil (Shelmerdine 1985: 19; Palmer 1994: 89-90). The alcohol content of wine and its liquidity would dissolve the essential oils of the aromatic plants and when the whole would be poured in oil and heated, this would cause the alcohol in the wine to evaporate. The essential oils would then bind with the olive oil. For this purpose, there was no need to waste good quality wine as an inferior quality beverage[14] would have accomplished the same purpose. The term **131b* in Linear B has been interpreted as 'must'[15] but, more recently, as inferior quality wine.

Therefore, a site such as Monastiraki with ubiquitous presence of grapes would be expected to have had a parallel production of all other products and by-products of the grape, as mentioned above. It must, then, be possible to find remnants of these categories of products and byproducts by, firstly, macroscopic examination for the location of sampling spots and, subsequently, by microscopic examination and analysis.

Moreover, the process of **dyeing** used the material —the decanted material— left at the bottom of the wine storage vessels, the lees.[16] One can therefore say that nothing was wasted in the wine-making cycle and the whole crop and by-products were of economic importance.[17]

We are, therefore, compelled to say that Monastiraki seems to have been a wine-producing site *par excellence*, but also a wine consuming one.[18] Had it been importing wine, one would not have expected to

14 Dioscorides mentions steeping 'a lump of myrrh in sweet old wine' (Dioscorides, *Materia Medica*, I.56; Shelmerdine 1985: 14).

15 Chadwick – Ventris 1973: 223, 441, but it has also been interpreted as inferior wine by Stanley (1982).

16 It is the whitish substance which gets deposited at the bottom of barrels or pithoi, the commonly known in Greek as "katakathi oinou".

17 The wood of the vine was used in architecture (Ορλάνδος 1955) and the cuttings, of course, were used as fuel, perhaps tinder. The excess (στέμφυλα – dregs) could also have been fed to animals (e.g. pigs) stalled at the site but could, also, have been used as manure.

18 It was mentioned above that the most common pottery type except for "pithoid"

find so many pips but, rather, wine brought in ready sifted and, therefore, would have been only identified by chemical analysis of their contents. Surely though, many pithoi which had no archaeobotanical data must, also, have contained liquids and probably, amongst other products, sieved or older wine.[19] The large number of storage jars, though, that has preserved pips, would argue in favour of Monastiraki being a very important wine producing site.

## Wine-making

After collecting the grapes ("vendema" in vernacular Greek (Sarpaki 1992),[20] these had to undergo the first stage of wine-making which was: (a) **crushing and pressing**. This operation does take place in one stage, on the same pressing artifact. It could be conducted in built structures[21] within buildings or in the open air.[22] In ancient Egypt, they are depicted as existing near the vineyards. For Monastiraki, we can say that no structure of this type has been found within the site, so far. Other structure, depending on the geology of the area, could have been cut in the rock and the pressing done in them. Such cavities have been connected to wine-pressing and have been published from the island of Gavdos (Χριστοδουλάκος – Κόπακα *et al.* 2000) and Kastellorizo[23] (Ashton 2002). However, depending on

(πιθοειδή) jars were drinking vessels and even the trickle design (dark trickles) on pithoi, typical to several Cretan sites, could, perhaps, have been a symbolic way of assigning them to wine.

19 If we argue that *all* pithoi with wine would have been found with dregs, that would mean that we would exclude the possibility of white and/or rosé wine existing at Monastiraki.

20 Sarpaki (1992) had collected ethnographic information from the modern village of Akrotiri at Santorini (Thera).

21 Immobile wine presses are called «ληνοί» in Greek.

22 At Methana, for example, they pressed the grapes on the hillside and carried the must in skins (Forbes 1981: 241). In the Middle Ages in Crete, some treaderies were communally owned and were generally placed within vineyards (Gasparis 2002: 228), so, perhaps, that is an indication which could have been the case too for the Middle Minoan period.

23 These are dated based on the pottery found in the relevant areas from the 6th BC to the first centuries AD (Ashton 2002: 149). Many other areas have produced such evidence in Crete (Yiapitsoglou – Moschovi 2002: 186) where he refers to

the method used, they can sometimes leave no archaeologically visible structures.

Other tools connected to wine pressing have been attributed to olive-oil pressing too. These have been found on Minoan sites, such as Kommos. Unfortunately, no such artifact has been found at Monastiraki. However, quite an intriguing figurine was depicted on a sealing from Malia (Fig.12) of a person treading, who could well have been crushing and pressing grapes (Kopaka 2002, fig.9:2a; *CMS* II/1, Nr 420).

Fig. 12 : *Sealing impression from the MM Chrysolakkos, Malia (CMS II/I, Nr 420) depicting a person/man pressing grapes (?) in a container*

Beck and McGovern analysed a sherd (EUM-136) from pithos 129, East Sector, room 70, from Monastiraki and it indicated, they believed, the possibility of the existence of resinated wine stored in an oak barrel. As the evidence of barrels, at such an early date, is not documented, perhaps it refers to wooden structures/press-beds, used to press the grapes and leave the must to ferment in them, trapping, thus, oak lactones (Marlew – Tzedakis 1999: 146-47), which showed up in the gas chromatography.

(b) **Fermentation** is where alcoholic fermentation would take 3-4 days, depending on the weather (Forbes 1965: 63). From Egyptian texts though, we know that wine could have been stored for up to three years (Forbes 1965: 80). Fermentation would have been triggered naturally by 2 enzymes, *Saccharomyces ellipsoideus* and *S. apiculatus* which occur on the skin of the grape and would trigger the proper fermentation. If honey and/or molasses were added before fermentation, then the alcohol content became very high. The stalks, stems, and seeds would produce astringent substances and colour-

rock-cut treaderies such as in Thasos, Lemnos, and the Halkidiki.

ing matter from the skins (Lucas – Harris 1999: 17). White and red grapes,[24] without the skins, usually produce white wine as the juice is colourless. So skins, if the desired effect is red wine, should only be removed after fermentation.

The amount of sugar present in the grapes affected the amount of alcohol in the wine. The yeast would be killed by the alcohol when the proportion reached about 14%, although there may be some sugar which escapes fermentation. The portion of sugar which escapes fermentation remains, imparting sweetness to the wine.

(c) **Filtration** (Fig. 13) could be done with rudimentary sieves, perhaps made of flax or some other material, in order to extract the dregs (pips, stalks, skins, etc.).

(d) **Filling** of containers where the wine would remain for the whole period of maturation and until the opening of the "jars" so to speak. It is possible that at Monastiraki, filtration did not occur, until the "opening of the jars," which generally takes place between February and March, depending on the weather and speed of wine maturation. At Monastiraki, therefore, we are either finding the stage during fermentation (a few days after crushing and pressing when the wine cannot be tempered with), so we could speak of a destruction within September/beginning of October, or else filtration would have been done after the "opening of the jars" between February and March. Therefore, in the second case, destruction of the site could have occurred between September and March.

(e) **Storage**. Wine can be transported as must just after pressing (surely before fermentation), but it is impossible to tell whether this took place too at Monastiraki. It could also have been transported after the completion of fermentation and the stabilization of the wine (Palmer 1994: 17) but not during fermentation. Once the wine has stopped fermenting, it would be strained and decanted into other vessels[25] (Palmer 1994: 18). Even simple filters could have

24 Only a few varieties of 'black' grapes provide a coloured juice (Lucas – Harris 1999: 18, note 1).

25 It is difficult to say whether that was a generalized procedure but there could have been variations "on that theme" and perhaps Monastiraki provides an

| Stage | Products | By-products |
|---|---|---|
| Pressing | Juice ⟶ | Wine & vinegar |
| | must ⟶ | Food & fodder |
| Fermentation | alcohol | |
| Filtration | Wine ⟶ | Pips, stalks, stems (fodder; manure; fuel) |
| Filling of jars | Pure wine | |
| Storage (stop fermentation) | Pure wine ⟶ | Lees/ dregs |

Fig. 13 : *Wine-making: products and by-products*

removed seeds, stems and skins. It is interesting to note that at Phaistos, a site with multiple connections to Monastiraki for a variety of reasons discussed elsewhere (Kanta 1999; Weingarten 1994; Palmer 1994; Reilaki 2003), produced a considerable number of vessels with strainers/sieves, bridge-sprouted and side-sprouted jars with sieves on their sprouts; Reilaki 2003: 258). In general, one could claim that Phaistos has a great elaboration of shapes associated with handling liquids.[26]

After wine consumption, at the base of pithoi, wine lees would be formed and needed to be scrapped out. These, of course, were very useful for other technologies, as discussed above. The pithos would also have needed to have been disinfected before pouring in the new

insight into these other possibilities. At Phaistos, a pithos containing many whole grape pips which Levi interpreted as raisins were discovered in Room LVIIIc (Logothetis 1970: 41-41), and if they contain just grape pips (without stalks, etc.) we might be seeing another "bartered" produce and that is dried raisins. Therefore, these samples need to be rechecked by an archaeobotanist.

26 It is interesting to note, as seen from the tablets, that in the Mycenaean period (Palmer 1994: 22) the palaces seem to have depended on the vinegrowers in the countryside for their wine. Is Monastiraki the proof that this was happening earlier?

must/wine. The disinfectant could have been ash added in water,[27] or else lime. These lees, according to Pliny (Forbes 1965: 232) must have made the best carbon black (Romans named it "atramentum").[28] Athenian painters made their black from grapeskins and called it "tryginon".

## Discussion

There are many questions that arise from the Monastiraki archaeobotanical material and several possibilities of answering issues which partake to Middle Minoan agriculture *per se*, but, also, immense possibilities to address issues of specialisation in agricultural produce and production. It is the earliest site, so far, where indication, of a 'cash crop', is so evident. The vine seems to be, for the site, one of its main produce, which we could possibly coin the term "barter crop".[29] Therefore, wine production, vine products and interrelated crafts (dyeing, preserving, perfumery) must have been an important part of the "raison d'être" of Monastiraki, as a site in the middle of the crossroads from the south to the north of Crete. Perhaps we could use the term "entrepôt" for Monastiraki, a nodal site for "barter" and a type of "Dilmun"[30] site in Greece.

Its connection and "dialogue" to Phaistos must have been of paramount importance in understanding the type(s) of produce which circulated, in what form, and the nature of these transactions.

27 This is called "alisiva" in certain parts of Crete and was a process done simply by all women for a variety of things, by burning some wood/twigs, collecting the freshly made (and clean) ash and pouring it on clothes. This is naturally made potash and could be poured on a variety of things to both disinfect and whiten, if clothes were involved.

28 From Egyptian texts, though, we know that wine could be stored up to three years (Forbes 1965: 80). So wine is put in skins, if the desired effect is red wine, after fermentation.

29 We use this term, as a counterpart to the term "cash crop" used by anthropologists and archaeologists for later societies.

30 Dilmun was an important island site in the Gulf and has been characterized by archaeologists as an "entrepôt" site.

Moreover, several important points emerge from the archaeobotany of Monastiraki. At this interim stage, they could be summarized as follows:

- The high presence of grape and the fact that Monastiraki must have produced and "consumed"[31] all the products of the vine. Probably, all the technologies connected to this production must also have thrived such as food preservation, dyeing and perfumery.
- The low 'visibility' of the olive stones/fragments.
- The small number of cereals.
- The higher presence of legumes, compared to cereals.
- Emphasis on some fruit trees such as almonds, figs and pomegranate.[32]

The archaeobotanical study of Monastiraki encloses, still, a great deal of surprises, before the results will reach a conclusive stage. However, whatever the outcome of these studies, we believe, they, surely, will not diminish the importance of wine production at the site.

ABBREVIATION

*Οίνος παλαιός ηδύποτος* : Αικ. Κ. Μυλοποταμιτάκη (επιμ.), *Οίνος παλαιός ηδύποτος: Το κρητικό κρασί από τα προϊστορικά ως τα νεότερα χρόνια. (Πρακτικά του διεθνούς επιστημονικού συμποσίου, Κουνάβοι, Δήμος «Ν.Καζαντζάκης», 24-26 Απριλίου 1998) / Old Sweet Wine. The Cretan Wine from Prehistory to Modern Times*, *(Proceedings of the International Conference at Peza, County of Pediada)*, Heraklion: Υπουργείο Πολιτισμού/Αρχαιολογικό Ινστιτούτο Κρήτης, 2002.

31 By "consumed" here we mean that they, probably, controlled the production and the "barter" at this particular level, which, of course, cannot define, at this point, in which level of hierarchy that refers to.

32 Perhaps, the presence of these particular trees, as well as the absence of other fruits, emphasize and reinforces the period of destruction to the autumn/early winter.

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