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The Bronze Age Cemetery at Lofou-Koulouzou (Cyprus): towards a Cross-Analysis of Radiocarbon Data and Funerary Assemblages from Burial Contexts

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Abstract

Rescue excavations at Lophou-Koulouzou (Limassol), carried out by the Department of Antiquities of Cyprus in 2010, revealed an interesting Bronze Age cemetery area. The investigation of the necropolis evidenced sixteen tombs whose general chronology ranges from the EBA to the end of MBA period (EC-MC II/III). A dedicated research project has been started up as a joint collaboration between the Department of Antiquities of Cyprus and the Missione Archeologica Italiana a Erimi (Cipro), with the aim of a comprehensive analysis of the excavation's results. The focus investigation of the funerary evidences was designed in order to verify contexts and chronology of the cemetery. The preliminary approach of the research developed towards two main directions: on one hand the analysis of stratigraphy and funerary assemblages; on the other hand, the radiocarbon dating of the skeleton remains from the burial contexts. A total of eleven bone samples were collected from eight tombs for radiocarbon purposes. Radiocarbon dating was performed at the AMS beam line of the INFN-LABEC Laboratory in Florence. In this paper, archaeological evidence and radiocarbon results are discussed and compared. The new data will also be compared with archaeological evidences and absolute dates from settlements and burial contexts of the same period, in order to define possible matching parallel sequences, and collect further information about the development and pattern of occupation of the Early to Late Bronze Age period in the Kourion area and generally in the Limassol District.

Keywords

Early-Middle Bronze Age Cyprus, Kourion region, Radiocarbon dates, Funerary architecture, Burial contexts.

Introduction

Archaeological evidence relating to the Limassol District in the Early-Middle Bronze Age comes mainly from large cemetery areas. Rescue excavations conducted by the Department of Antiquities of Cyprus have allowed us to identify and document vast cemeteries and tombs clusters mostly at Erimi-Kafkalla, Lophou-Chomatsies, Vournia and Koulaouzou, Paramali-Pharkonia South and North as well as within the modern town of Limassol (Karageorghis 1977; 1978; Christou 1994; 1996; Flourentzos 2001). The overall framework has been

enriched in recent decades with new data coming from cemetery area at Psematismenos-Trelloukkas (Georgiou et al. 2011), from Pyrgos-Mavrorachi (Belgiorno 2002; 2009), from the american investigations of EBA-MBA cemeteries at Sotira-Kaminoudhia and Episkopi-Phaneromeni, which took place in the 1980s (with some continuation in the 2000s) and late 1970s respectively (Swiny et al. 2003; Carpenter 1981), and from the recent Italian archaeological project at Erimi, which is still in progress (Bombardieri et al. 2009; Bombardieri 2012a; 2012b). The last mentioned cases have been essential in allowing us to correlate the cemeteries with their settlements. Features, function and material assemblages from domestic and workshop contexts have been progressively detected, as documented by the peculiar case of Erimi-Laonin tou Porakou, where a domestic quarter, a workshop complex and a contemporary cemetery are currently being excavated in the same site area (Bombardieri et al. 2011; Bombardieri 2012a). Thus, the development of the archaeological research in the region enabled us to increase quantity and quality of the records at disposal. At the same time, ongoing excavations in other regions of the island can obviously offer further comparative data. In addition to the evidence that comes from Marki-Alonia (Frankel and Webb 1996, 2006 with references), which still represents the basic reference for Cypriote Early and Middle Bronze Age, contemporary parallels can be traced to Prasteio-Mesorotsos (McCarthy et al. 2008) and Kissonerga-Skalia, where an EC-MC workshop area is being investigated by the British expedition (Crewe et al. 2008; Crewe et al. 2011), while additional data are expected from the newly resumed excavations by the University of Queensland at Alambra-Mouttes.

In spite of the increase of the available data, yet limited attention has been paid to the definition of a reliable chronological sequence on regional ground, a matter that is becoming more important as more clear is the presence of regional variants, especially in pottery styles and material productions (but also in building techniques) (Webb 2013; Georgiou et al. 2011: 279-299).

(L.B.)

The joint research project on the background of funerary evidence from Kourion region during EBA-MBA period.

In this broad framework, a joint project of the Department of Antiquities of Cyprus and the Missione Archeologica Italiana at Erimi has been initiated with the twofold aim of contextualizing and cross-checking the Early to Middle Bronze Age evidence from funerary and settlements contexts in the Kourion region. Three

necropoles corresponding to contemporary and comparable funerary areas excavated in the last years have been opportunely selected as case studies: the first one is the Southern cemetery at Erimi-Laonin tou Porakou, the second one is the cemetery of Lofou-Koulaouzou, situated north-west of the Kouris Dam, about 10 kilometers north of the modern village of Erimi, and the third one is the large necropolis of Erimi-Kafkalla, located about 1.5 kilometers north of Erimi (**Figure 1**).

Funerary architecture, topography and chronological range of occupation have been considered as basic evaluation criteria and elements of comparison among the three selected case studies. As far as topographic arrangement and funerary architecture are concerned, the three cemeteries mentioned above show significant affinities. The characteristic calcareous formations of the Kouris and minor adjacent valleys represent a common natural layout for the three necropoles: here the marl and chalk formations give shape to a typical scenery of rather large plateaux on top of hills and terraces sloping down towards the valley floor, with surface deposits of secondary limestone *havara* (Krashennikov *et al.* 2005; Swiny 1986, 82). Hence, the geomorphology and peculiarities of the landscape are the basis for the arrangement of tombs using the natural terraces sloping towards the Kouris and minor valleys. The different exploitation and therefore the greater or lesser density of graves by area is in the same way probably due to the natural conformation of the single terrace, more or less suitable for carving the tombs. In fact, besides minor interventions intended to regularize the terraces (mainly addressed to facades), the high variability in the exploitation of the cemetery area is much more obvious. We are therefore faced with a choice based on adaptation to the topography and natural character of the landscape, rather than on the need to create a *funerary ambience* with precise characters. As to the funerary architecture, rock-cut chamber tombs or pit graves are the sole attested types, with a large majority of single chamber tombs with irregularly rounded plan and cave-like section. Close examples of single chambered tombs with small oval *dromoi* are documented in the region by S. Swiny surveys at Evdhimou-Amolo and Ambelovounos, and considered similar to the plans of contemporary EC complexes at Vounous (Keswani 2004, 61). Philia to MC cemetery areas at Psematismenos-Trelloukkas (EC I-II), Pyrgos (EC I-II), Kalavassos-Cinema area and Panagia Church (EC II to MC), Sotira (Philia to EC III), Maroni-Maraes as well as Avdimou-Kamares (EC II to MC) provide well dated evidence for the range of tomb types in the region (Georgiou 2001; Georgiou *et al.* 2011, 341-342 with references; Todd 1986, 2007; Belgiorno 2002; Swiny *et al.* 2003; Vavouranaki and Manginis 2004).¹

The presence of regularized *stomia* is documented, while rare is the presence of benches for the offering-goods within the deposition chamber. Quite a few cases of more elaborated multi-chambered tombs with trench-type

dromoi are documented in the region at Erimi-Kafkalla, as already recorded by S. Swiny survey (1981, 82), and Episkopi-Phaneromeni (Weinberg 1956; Carpenter 1981; Georgiou *et al.* 2011, 294). The most elaborate trench-type *dromos* known so far, measuring 8m in length and opened to 9 to 12 chambers arranged on pairs, has been found just at Phaneromeni (Weinberg's Trench 4, Weinberg 1956, 121, Fig. 13; Keswani 2004, 61). A wide range in chambers' dimensions can be also highlighted, as recorded in the cemetery of Erimi-Laonin tou Porakou and Erimi-Kafkalla (Bombardieri *et al.* 2011, 94; 2012b). It is unclear as to whether these architectural features and/or dimensions variability served to mark a distinction among tombs of the same cluster, thus reflecting an intra-community distinction in status, as observed at Psematismenos (Georgiou *et al.* 2011, 356).² In the region, other cases of multi-chambered tombs, but with shaft-like *dromoi*, are known from Paramali-Mandra and Pharkonia (Swiny 1981, 83), with more evident affinities with types documented at Maroni-Kapsaloudhia (Keswani 2004, 61).

The third evaluation criterion mentioned above, is the chronological assessment. In this case, in order to verify the eventual match of the contexts and to evaluate chronological affinities of those three large cemeteries, we designed a focus investigation dedicated to the analysis of the funerary evidence.

Two main directions were developed at the same time:

1. the *archaeological analysis* of deposition contexts and funerary assemblages;
2. the *radiocarbon dating* of the skeletal remains.

The aim of this approach is clearly to increase the body of evidences and to allow a crossed-verification of the available data, following two parallel methods of analyses to define possible matching parallel sequences.

The results of the first case study of Erimi-Laonin tou Porakou were discussed in 2011 during the Radiocarbon & Archaeology Conference and Annual PoCA Meeting held in Paphos and Lyon, respectively (Scirè Calabrisotto *et al.* 2012; Bombardieri *et al.* 2011). The second Case Study, whose focus is upon the Bronze Age cemetery area of Lophou-Koulaouzou, has been presented in 2012 at the Symposium on Mediterranean Archaeology held in Florence and represents an additional example of how archaeological evidence, anthropological analysis and radiocarbon dating have been combined.

(L.B.)

The cemetery area

The area of Lofou, situated in the Kourion hinterland, 20kms to the NW of Limassol (**Figure 1**), is rich in Bronze Age remains, and it has first become known from accidental discoveries, which occurred in 1983 during the construction of the road linking the villages of Lofou and Alassa (Karageorghis 1984, 910). The rescue operations

¹ The greater variability in tomb type and size through Early Bronze Age and across an entire cemetery space at Deneia has been deeply investigated in recent years by D. Frankel and J. Webb (2007).

² Concerning EC architectural elaboration of tombs from North Coast cemeteries at Lapithos, Karmi and Bellapais, see the discussion in Webb and Frankel 2010, 187-194.

carried out by the Department of Antiquities revealed a necropolis in the areas of *Vournia* and *Chomatsies*, both dated to the Early and Middle Bronze Age.³ After the first mentions by V. Karageorghis (1984, 910) further analyses of the funerary assemblages were carried out by S. Swiny and E. Herscher at the beginning of the 1990s (Herscher and Swiny 1992, 77-81). E. Herscher and S. Swiny published and compared the *Chomatsies* and *Vournia* data to material coming from Paramali-*Pharkonia*. However, the archaeological material used then was deficient and heavily disturbed by systematic clandestine digging, which has been going on in Lofou area for decades. The cemetery area of Lofou-*Koulaouzou* has been identified in 2010, after the Department of Antiquities was informed that several tombs were revealed during illegal construction operations for a road. The site of *Koulaouzou* is actually located exactly to the south, and it seems to form the same cemetery with *Vournia*, which in turn is an extension of the cemetery at *Chomatsies*. We are basically talking about a spatially extensive cemetery area, of about one kilometer in total length, where clusters of tombs exist, which obviously belong to the same cemetery, and that is why Herscher and Swiny (1992, 77-78) named it Lofou-*Chomatsies* South and North cemeteries. The tombs at *Koulaouzou* and *Vournia* occupy a series of limestone terraces, sloping on both banks of the same steep gully, while the cemetery at *Chomatsies* is separated from them because of the peculiarities of the local topography, and it occupies a nearby slope situated immediately to the north of the steep gully. Since the area has not yet been systematically surveyed, we only have pieces of the complete picture at our disposal, and one must also take the effects of looting, erosion and land improvement through systematic terracing into account. However, there is no doubt that we are faced with a major cemetery area. Concerning the 2010 excavations at *Koulaouzou*, a total of 16 rock-cut chamber tombs were excavated, all located in the western bank of the gully (**Figure 2**). Most of these tombs were either disturbed by clandestine digging or by recent bulldozing operations, or both. The tombs exhibit the standard form of a single, irregularly rounded to ovoid chamber, with a cave-like section and a wide dimensional variability. Usually the *stomion* and the *dromos* area were disturbed but in at least one case where the tomb was intact, a vertical rounded *stomion* was revealed, as well as a short, generally rectangular *dromos* (**Figures 3-4**).

(Y.V.)

Chronology, Material Assemblages and Contexts

Regarding the general chronology, the preliminary overall analysis of the funerary architecture types and the material assemblages, hint to an occupation sequence ranging from the beginning of the Early to the end of the Middle Bronze Age (EC-MC II/III). As to ceramic

evidence, some general peculiarities within the offering deposits at *Koulaouzou* appear to be typical of a local horizon of production. Special containers, such as zoomorphic *askoi*, are documented from *Koulaouzou* tombs: two RP III Bird-shaped *askoi* come from Tombs 18 and 23 (T18/4 and T23/8) (**Figure 5**). The production of these type of zoomorphic vessels is largely attested both in RP and WP wares, especially from MC I-II contexts (Des Gagniers and Karageorghis 1976, Pl. XXXIII, XXXVI; Frankel and Webb 2006, Pl. 44; Herscher 1975, Fig. 20; Dunn-Vaturi 2003, Pl. XXIV).

As to the *askoi* from *Koulaouzou*, T18/4 has ovoid body flattened on top, cylindrical neck with cutaway spout, vertical handle from rim to mid-body and short (pointed) tail. The decoration appears as a series of low incisions forming a pattern of zigzag and parallel lines on the neck and body. Similar RP III Bird-shaped *askoi* come from Marki-*Alonia* (Frankel and Webb 2006, 119) and from Tsirides Collection (Karageorghis 2011, nos. 52, 53); the general shape of the body, the absence of pierced lugs and possibly the not dense decoration may be comparable in particular with examples from the Limassol region (from Pyrgos Tomb 1 and Alassa Tomb 1, especially) (Belgiorno 2002, Pl. 1.1; Flourentzos 1991, Pls. XIV.XV), thus suggesting a South Coast production, as already pointed out by V. Karageorghis (2011, 49). The second *askos* from *Koulaouzou* (T23/8) has expanded ovoid body, vertical loop handle from rim to mid-body and small pointed back (without applied tail). This one is differently supported on three short knobbed legs. The decoration is limited to a simple zigzag incised on the handle. Analogous examples (even if normally with relief decoration as well) come from the region and were found at Paramali (Des Gagniers and Karageorghis 1976, Pl. XXXIII: 3), Pyrgos Tombs 1 and 21 (Belgiorno 1997, no. 49 and 2002, Fig. 1), Limassol downtown Tomb 3/1 (Karageorghis 1940-48, Fig. 28) and Psematismenos Tomb PKK/94 (Webb *et al.* 2007, no. 30). More rare analogous *askoi*, or Ring-vases, are also attested in DP ware and have been dated back to MC III (Karageorghis 2010, no. 53 from Severis Collection).

A further interesting aspect concerns the occurrence of peculiar motifs within the ceramic decorative repertoire. This is the case of the applied circles and, mostly, the upward or downward looking lunettes (**Figures 5-6**). Examples of the latter motif are common at *Koulaouzou* particularly on double handled jars and globular jugs (T11/8; T13/1; T16/3; T23/2). It is interesting to note that applied lunettes are normally not associated with other decorative elements (only on T23/2 the motif is associated with another relief decoration, i.e. a snake-like motif). On the other hand, this element is often repeated on the same vessel: on the shoulder, two times on the opposite sides (as on the double handled cooking pot T16/3); two times on the neck and shoulder (as on the globular jug with narrow vertical neck T23/2). On the ovoid jug (T13/1) with narrow loop on the neck, a single lunette is the only decoration motif on the body and it is strangely applied on the back of the shoulder, close to the handle attach, without any apparent symmetry (**Figures**

³ V. Karageorghis (1984, 910) refers to three single-chambered tombs already looted at the moment of the discovery (numbered as Tombs 5-7, Inventories of Limassol Museum LM RR 940-942).

5-6).⁴ This motif corresponds to the *Relief Crescent*, as defined by E. Herscher (2003, 184), which is well attested at *Sotira-Kaminoudhia*,⁵ while it seems scanty represented in the *Marki-Alonia* (Frankel and Webb 2006, Fig. 4.37) assemblages.⁶ Further parallels for this motif are also well attested at Kalavassos from EC II to MC II contexts (Tombs 54, 57 and 62) (Todd 2007, Fig. 23:2; 31:4; 29:4; pl. XXVII:3).⁷ This motif seems instead fairly common at *Lofou-Koulaouzou* and also appears at *Erimi-Kafkalla*, *Avdimou-Kamares* from an EC III-MC I burial context (Tomb 26: Manginis and Vavouranakis 2004, 112, T26/03; T26/5A) and on a fragmentary RP Mottled amphora from *Chomatsies* North cemetery Tomb 7, dated to the EC III-MC I (Herscher and Swiny, Pl. XV: 2), thus suggesting that this motif could be a peculiar element within a shared decorative local repertoire.

The small finds assemblage includes RP and BP spindle-whorls with an incised decoration *repertoire* which can be broadly referred to the standard MC I-II South Coast horizon, according to the classification proposed by L. Crewe (Types III C-D) (Crewe 1998, 40-41) (Figures 7, 14). Spindle-whorls are documented in 5 of the 16 excavated tombs (Tombs 11, 16, 20, 21 and 23), with a variable *ratio* between one and eight whorls per grave. Any consideration about both the diffusion within the cemetery and the average number of whorls per tomb is obviously influenced by the long-term clandestine diggings within the cemetery area, which heavily affected the analyzed sample; it is however interesting to note that a single whorl comes from each of the Tombs 11, 16 and 21, two whorls from Tomb 20 and eight from the sole Tomb 23.

As far as personal ornaments are concerned, Picrolite objects are well attested while only a single metal item comes from the investigated burial contexts, that is a copper-based alloy pin from Tomb 21 (T21/3). Considering the evidence in contemporary Early Bronze Age funerary contexts in the South Coast region and beyond, the presence of Picrolite disks within the offering deposits from *Koulaouzou* is not surprising (Figure 8). Three disks of this type with different dimensions come only from Tomb 23 (T23/15, 16, 22), together with a single spherical limestone bead (T23/23). Analogous disks have been described as stone button or toggles (or differently as stone spindle-whorls) and are largely attested in funerary and settlement contexts from EC III period at *Marki-Alonia* (Frankel, Webb 2006, Pl. 58) to MC-LC I period at *Pyrgos* (Belgiorno 1995, Fig. 2) and *Episkopi-Phaneromeni* (Swiny 1986, Fig. 20), as well as

in private collections (Tsirides Coll. Karageorghis 2011, nos. 112, 117; Severis Coll. Karageorghis 2010, nos. 41, 43). In addition to the mentioned examples, it is interesting to note the presence of peculiar Picrolite beads and pendants types, which are definitively less diffused and could be eventually considered as local productions. The Picrolite bead from *Koulaouzou* Tomb 17 (T17/1) can be ascribed to this production (Figures 5, 15). It has parallelepiped body with smoothed edges, a major circular hole drilled from side to side, possibly for suspension, and a smaller circular one drilled into one of the large faces. An analogous bead (even if tubular, i.e. rounded in section) is now in the Severis Collection in Nicosia and represents the closest parallel for this Picrolite object (Karageorghis 2010, no. 42). The bead from *Koulaouzou* together with other peculiar-shaped pendants from the Limassol district⁸ seems to advocate to the role of the region in the Picrolite manufacture, also during the Early and Middle Bronze Age. Moreover, the long-standing tradition of Picrolite manufacture in the area, dating back to Chalcolithic (Peltenburg 1991, 115-116; Xenophontos 1991, Fig. 3; Xenophontos *et al.* 1992), and the importance of the Kouris river bed as a primary source for the supply of this stone, also in later periods, can support this hypothesis. Besides the attestation of Picrolite personal ornaments, the presence of ground stone tools within the funerary deposits represents another recurrent and peculiar evidence, already recorded in both the other case studies we are investigating at *Erimi-Laonin tou Porakou* and *Erimi-Kafkalla*. Reason why we are inclined to regard the presence of these processing tools in some of the burials as an interesting marker, which could also reflect the range of activities, on which could have been based the economy of the rural communities being studied (Bombardieri *et al.* 2009, 140; see also Amadio, Chelazzi, in this volume). At *Koulaouzou* both gabbro and granite active polishers and lower grinding stones were found within the offering deposits of four of the 16 investigated tombs (Tombs 8, 11, 21 and 23) (Figure 9). Within this general framework, the preliminary analysis of the material assemblages for each burial from *Lofou-Koulaouzou*, has led us to fix two extremes, represented by Tomb 13, which at the moment may be considered as the oldest one, and by Tomb 8, which is likely to be the most recent.

The offering deposit of the oldest Tomb 13 includes a RP I globular jug with medium-wide neck tapering to broad cutaway mouth (T13/1), which can be compared with types of the EC I-II period, widely attested at *Maroni-Maries*, *Avdimou-Kamares* and *Psematismenos-*

⁴ It is interesting to note that on an analogous RP I jug from Vounous A Tomb 120, now in the Hunterian Museum, University of Glasgow (Başak *et al.* 2005, 40), an inverted V-shaped motif is incised before firing at handle base, i.e. at the same place as in T13/1.

⁵ On Amphorae Type D and Juglets Type E (examples are P83 and P55) (Herscher 2003, 184).

⁶ In the region of Marki, we found this motif, associated with *bucrania*, on a RP III globular jug from Kotchati (Des Gagniers and Karageorghis 1976, Pl. XXVI: 1).

⁷ A similar motif, diffused in the North Coast region, is described as *Uprturned crescent* or *U-shaped* by J. Webb (Webb *et al.* 2009, 13, 128); examples come from Vounous (Dikaios 1940, Pl. L: 9) and from EC III and MC I-II burial contexts at *Lapatsa* and *Karmi-Palealona* (Lapatsa Tomb 1 and Karmi Tomb 5, Webb *et al.* 2009, Figs. 2.57: 11; 3.97: 92).

⁸ Elaborated Picrolite pendants come from *Chomatsies* Tomb B, dated back to early MC by E. Herscher and S. Swiny (1992, 80; Fig. 3.4) and from an MC Tomb in the *Limassol-Katholiki* (Karageorghis 1967, 306; Fig. 90); A provenance from the same area can be postulated also for the elaborated types from Tsirides, Zintilis and Severis Collections (Karageorghis 2010, no. 40; 2011, no. 118; Lubsen-Admiraal 2004, nos. 16-17). The only exception is represented by the example from *Souskiou-Vathyrkakas*, dated back to Middle Chalcolithic period by L. Vagnetti (1980, 63, Pl. XIX). Picrolite Comb-shaped pendants from *Erimi-Laonin tou Porakou*, *Episkopi-Phaneromeni* and from Zintilis Collection must be also included in this peculiar regional production. See Bombardieri, Fourier, Violaris, forthcoming (with references).

Trelloukkas (Georgiou *et al.* 2011, 222).⁹ The narrow loop of jug T13/1 typically appears as an oblique band which loops downward across the neck from one side of the upper handle join to the other, ending on each side of the handle in a flat-topped knob, with central puncture. This motif finds close parallels from funerary contexts at Psematismenos-*Trelloukkas*, where analogous EC I-II Red Polished Mottled jugs normally have this type of relief decoration (Georgiou *et al.* 2011, 221-235; figs 3.43, 3.45–8; Webb 2013).¹⁰ It is interesting to note that the jug T13/1 shows both an applied lunette on the shoulder and a downward curving loop on the neck. As discussed above, the latter motif is commonly attested on analogous ovoid or globular-bodied jugs with flat base from EC I-II contexts, while applied lunettes seem mostly diffused from late EC and MC contexts (EC III to MC I-II). This is the standard chronological range documented at Avdimou-*Kamares* and Kalavassos village, while no evidence of this motif come from *Trelloukkas* (EC I-II). Thus, it can be argued that jug T13/1 attest a quite unusual association and, possibly, may be considered as a peculiar ‘early’ attestation of the motif. A smaller assemblage comes from Tomb 8, where together with a huge RP double-handled amphora (similar to the Storage Vessel Type B from Sotira), a fragmentary Drab Polished handled jug with cutaway mouth was found (T8/3) (**Figure 10**), which is comparable with more recent MC III-LC I examples from Paramali (Paramali-*Lakho*: Herscher and Swiny 1992, 75-76; Pl. XIII: 3), and particularly in the Paphos region with examples from Kissonerga area (Kissonerga-*Ammoudhia*; Kissonerga-*Skalia*: Crewe *et al.* 2011, Fig. 6).

(L.B.)

Tombs 15 and 20: the comparative cases

Considering the methodological approach of our project, it is particularly interesting to draw our attention to Tombs 15 and 20 (**Figures 2, 3**), which have yielded absolute dates, as a result of radiocarbon dating of the skeletal remains. Tomb 15 was well-preserved, apart from its facade with the *stomion*, which was destroyed by the recent bulldozing activities. It has an ovoid plan (1.15x1.55m) and a cave-like section with a maximum height of 1.05m. Regarding its material deposit, Tomb 15 has yielded an assemblage of nine complete vessels and few sherds pertaining to other fragmentary ones.

The RP bowls assemblage include shallow or deep hemispherical bowls with horizontal double pierced lug (T15/8), or elongated vertical unpierced lugs (T15/6), which find their best parallels at Marki phases E-F, dated back to the EC III period (Frankel and Webb 2006, 109-

111). A similar date is suggested by the large RP basin (T15/4) (**Figure 11**), analogous to Marki large bowls (Frankel and Webb 2006, Text Fig. 4.34) and by the jugs and juglets (T15/5 and T15/1) (**Figure 12**) with globular body, narrow neck and simple relief and/or incised decoration, that can be compared with RP and RP Mottled globular jugs from Paramali-*Pharkonia* and jugs Type D, juglets Type E from Sotira-*Kaminoudhia* (Herscher and Swiny 1992, Fig. 1: 4; Herscher 2003, Fig. 4.6: P57; Fig. 4.7: P55). In discussing the evidence of Tomb 20, it is obvious that it was the best preserved tomb we excavated, the reason being it is located in a remote and very steep area of the west bank of the gully at *Koulaouzou*, away from the area where the bulldozer cut the new road. It has a square *dromos* with a side of a bit over a meter, and a rounded *stomion* of almost 50cm in diameter. The facade, where the *stomion* is opened, has been worked out and made vertical. The chamber is roughly circular to ovoid in plan, 1.70x2.10m and it has a cave-like section with a maximum height of 1.30, just next to the *stomion*. An assemblage of seven complete vessels, including a RP funnel (T20/1) (**Figures 5, 16**), sherds belonging to two further vessels and two decorated spindle-whorls (T20/8-9) (**Figure 14**) have been found within the funerary chamber of Tomb 20. RP funnels are quite unusual objects, the T20/1 with vertical pierced lug can be closely compared with examples from EC I-II funerary contexts at Psematismenos and Tersephanou (Georgiou *et al.* 2011, Fig. 3.63; Bolger, Webb 2013, Fig. 3.24: 4, dated to ECY4; Flourentzos 2001, Pl. II: 19). A similar example from Tsirides Collection has been also dated back to EC II-III by V. Karageorghis and J. Webb (2011, no. 26). Particularly interesting is the double handled RP amphora (T20/7) (**Figure 13**) with simple rounded base, globular body, wide cylindrical neck and flaring flattened rim. A horned animal's head is applied on mid-neck. Similar relief motifs (ram's head and/or *bucrania*) appear on a globular jug with double neck from Vounous Tomb 19 (Dikaïos 1938, Pl. XIX: d) and on a RP III globular jug from Kotchati (Des Gagniers and Karageorghis 1976, Pl. XXVI: 1). The small RP hemispherical spouted bowl (T20/4) and the bowls with incoming walls and round base (T20/3, 5), find good parallels at Marki-*Alonia*. It has been noted by Frankel and Webb that the frequency of this last type with horizontal and not pierced lug (similar to our T20/5), increases at Marki during the F to H Phases, that is during the EC III- MC I/II period (Frankel and Webb 2006, 149).

(Y.V., L.B.)

Radiocarbon analyses of skeletal material from Tombs 15 and 20: methodology and results

As for the skeletal material of the Bronze Age necropolis of Lofou-*Koulaouzou*, only eight tombs yielded human remains: Tombs 8, 13, 15, 17, 18, 19, 20 and 21. Prior to sampling for radiocarbon purposes, anthropological analyses were performed in order to determine the MNI (Minimum Number of Individuals) of each tomb, thus allowing taking at least one bone sample from each

⁹ Generic similarities can also be traced with examples coming from North Coast region. See Stewart 1988, Type IA¹ h; Vounous A Tomb 120: Stewart 1988, no. 5; Başak *et al.* 2005, nos. 97-98; Lapatsa Tomb 1, earliest burial; Tomb 15: Webb *et al.* 2009, Fig. 2.56: 12; 2.69: 9.

¹⁰ An analogous narrow loop (partially missing on the neck) also appears on a RP Mottled jug from Paramali-*Pharkonia* (Herscher and Swiny 1992, Fig. 1: 4; Başak *et al.* 2005, nos. 97-98; Lapatsa Tomb 1, earliest burial; Tomb 15: Webb *et al.* 2009, Fig. 2.56: 12; 2.69: 9.) and on a RP Mottled jug from Psematismenos-*Trelloukkas*, from an EC I-II context (originally dated to MC by I. Todd) (Todd 1985, Fig. 7; Pl. VIII.5; Bolger, Webb 2013, Fig. 3.21: 5, dated to ECY4) and on a large RP Mottled jar from Kalavassos-Panagia Church (Tomb 67/48; Todd 2007, Fig. 23:1).

identified individual. A total of eleven bone samples were then collected, mainly from femurs midshaft.

All the samples were prepared and measured by AMS at the LABEC (Laboratorio di Tecniche Nucleari per i Beni Ambientali e Culturali) Laboratory of the INFN (Istituto Nazionale di Fisica Nucleare) in Florence. Detailed information about samples processing and the AMS facility at the INFN-LABEC can be found in Fedi *et al.* 2007. Here we only recall the first crucial phase of the preparation of samples, i.e. the acid-base-acid pre-treatment.¹¹ This step has the double purpose to extract the suitable organic fraction to be radiocarbon dated, namely collagen, and to remove any contamination of foreign carbon that could possibly be contained in the sample. It is significant to notice that the yield of collagen we obtain after the pre-treatment phase strongly relies on the preservation state of bones; more specifically, bones that are bad preserved are likely to be low in collagen content, thus meaning there could not be enough organic matter to be radiocarbon dated, after the pre-treatment. As for the samples from the necropolis of Lofou, it is thus important to underline that bone material was quite badly preserved and covered with limestone incrustations on the whole surface. Besides severely limiting anthropological analyses, this condition also affected the yield of collagen after the chemical pre-treatment; as shown in **Table 1**, only six samples out of eleven had enough collagen to be radiocarbon dated. Table 1 also displays the values of the measured Carbon/Nitrogen atomic ratio, the measured radiocarbon age, and the calibrated age for each sample. Concerning the Carbon/ Nitrogen atomic ratio, this is a parameter routinely measured in the laboratory in order to assess collagen quality. According to literature (De Niro 1985), this value should range between 2.9 and 3.6 thus indicating a good collagen quality sample. As shown in Table 1, the measured values of Carbon/ Nitrogen atomic ratio for the samples of Tomb 8 and Tomb 21 fall outside the recommend range, hence indicating a possible contamination. This hypothesis is further evidenced by the calibrated age we obtained for each sample: samples LT8_1 and LT8_2 from Tomb 8 have been dated back to the Iron Age and to the Late Cypriote II/III, in contrast with the chronological range obtained through the analysis of the funerary goods that pointed to the end of MC (as discussed before). As a consequence, both samples from Tomb 8 were discarded. As for sample LT21 from Tomb 21, the measured value of Carbon/ Nitrogen atomic ratio slightly differs from the extreme value of 3.6 but, unfortunately, no diagnostic material that could either support or contradict the hypothesis of contamination has been yet identified from this tomb; as a consequence, also sample LT21 has not been taken into consideration, at least until further information on this tomb are found.

On the other hand, samples LT15_1 and LT15_2 from Tomb 15 and LT20_2 from Tomb 20 show acceptable values of Carbon/Nitrogen atomic ratio, and the calibrated ages we obtained are in good agreement with

the chronological range proposed on archaeological basis and broadly referring to the beginning of MC period.

(C.S.C., M.F., L.C.)

Concluding remarks

The analysis of the funerary assemblages recovered in the necropolis of Lofou-Koulaouzou points to a period ranging from the ECI to the end of MC. As for the radiocarbon results, the absolute dates we obtained are consistent with the archaeological data but they only refer to the period ranging from the end of EC to the beginning of MC, thus not comprising the whole phase of utilization evidenced through the analysis of the offering good deposits. Nevertheless, these preliminary results are of significant importance to test the reliability of the procedure of crossing the archeological and radiometric data, which is the basis of our methodological approach. In addition, the present study on the necropolis of Lophou can enrich the database of Bronze Age settlements and cemeteries in the Kourion area, which is the focus of our joint research project, and eventually contribute to outline a regional framework of the occupation patterns in the Early and Middle Bronze Age period in the whole South Coast region of Cyprus.

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¹¹ The standard protocol adopted at the INFN-LABEC for chemically pre-treat bone samples can be found in Scirè Calabrisotto *et al.* 2012.

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Figure 1: Map of Limassol region with the location of the Bronze Age cemeteries of Lofou-Koulouzou, Erimi-Laonin tou Porakou and Erimi-Kafkalla and Pitharka.



Figure 2: Lofou-Koulouzou. General view of the cemetery area (photo by Y. Violaris).



Figure 3: Lofou-Koulouzou. Tomb 15 (photo Violaris).



Figure 4: Lofou-Koulouzou. Tomb 20 (photo Violaris).

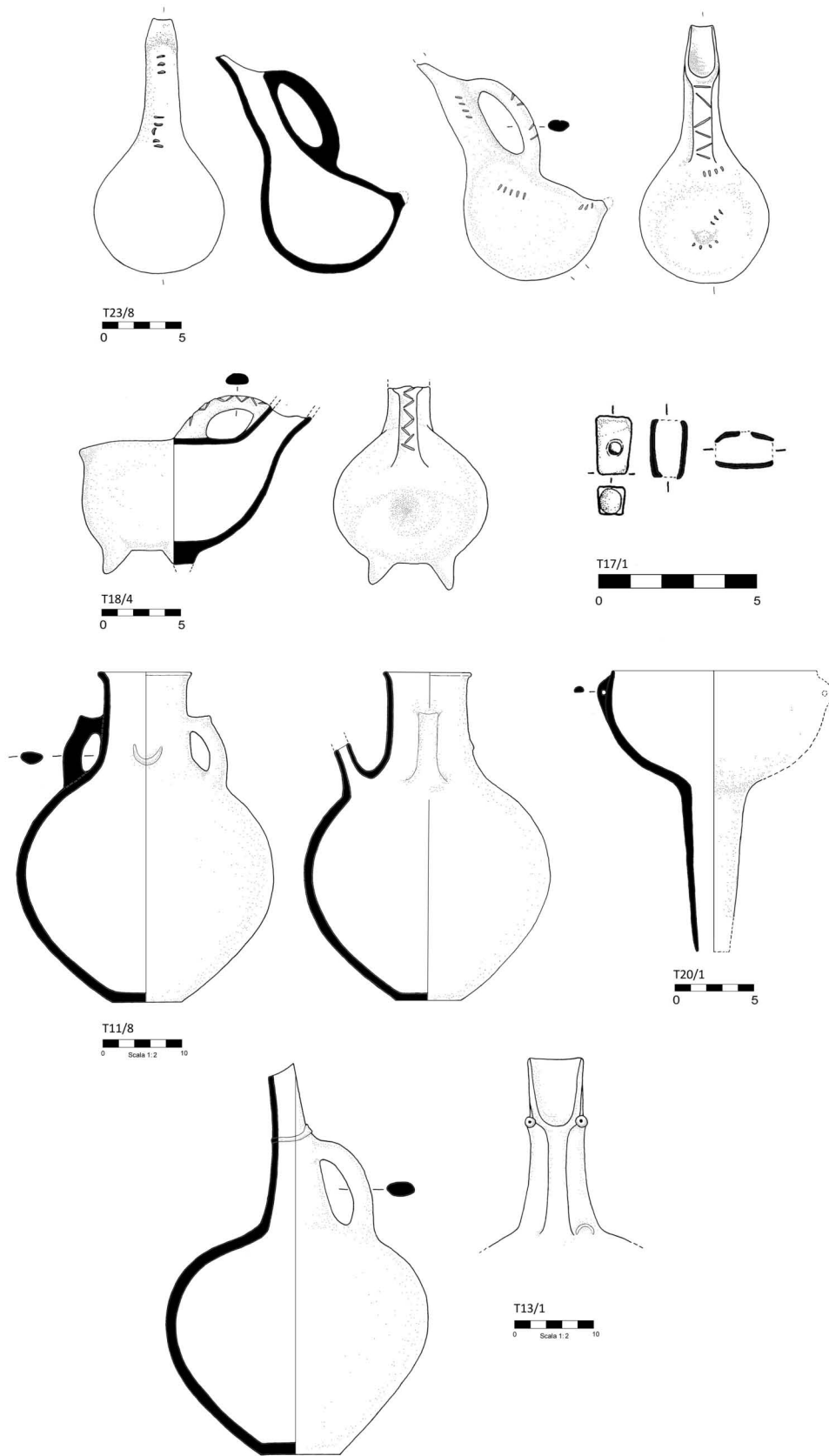


Figure 5: Lophou-Koulauzou. Ceramic and small objects from offering-goods deposits.
 (drawn by V. Cardini, Archivio Missione Archeologica Italiana a Erimi, Cipro)



Figure 6: Lophou-Koulouzou. RP vessels with applied “lunettes” (photo by L. Bombardieri).



Figure 7: Lophou-Koulouzou. RP spindle-whorls with incised decoration (photo by L. Bombardieri).



Figure 8: Lophou-Koulouzou. Picrolite disks (photo by L. Bombardieri).



Figure 9: Lophou-Koulouzou. Ground stone tools from burial contexts.



Figure 10: Lophou-Koulouzou. DP handled jug with cutaway mouth from Tomb 8 (T8/3).



Figure 11: Lophou-Koulouzou. RP basin from Tomb 15 (T15/4).



Figure 12: Lophou-Koulouzou. RP globular jug from Tomb 15 (T15/1).

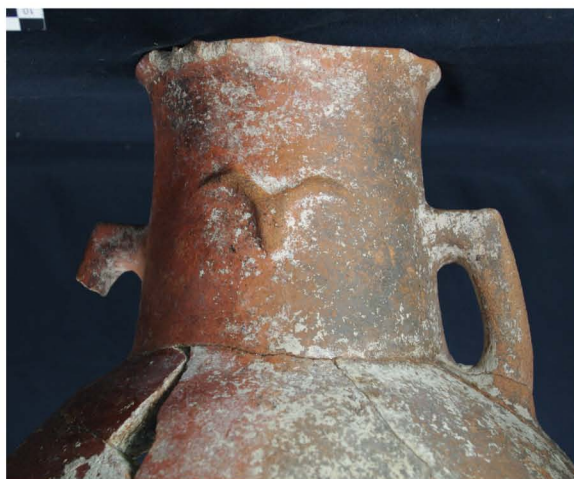


Figure 13: Lophou-Koulouzou. RP amphora with applied horned animal's head on mid-neck from Tomb 20 (T20/7).

(photos by L. Bombardieri)



Figure 14: Lophou-Kolaouzou. Spindle-whorls with incised decoration from Tomb 20 (T20/8, 9).



Figure 15: Lophou-Kolaouzou. Picrolite bead from Tomb 17 (T17/1).



Figure 16: Lophou-Kolaouzou. RP funnel from Tomb 20 (T20/1).

(photos by L. Bombardieri)

sample	C/N (± 0.2)	t_{RC} (years BP)	Cal. Age (BC) (95% confidence level)
LT8_1	5.5	2582 \pm 59	845-520.
LT8_2	5.9	3016 \pm 74	1430-1045
LT15_1	3.9	3684 \pm 42	2150-1950
TT15_2	3.7	3686 \pm 39	2150-1955
LT20_2	3.8	3707 \pm 46	2210-1955
LT21	4.2	3443 \pm 45	1885-1635

Table 1: Results of C/N atomic ratios, average conventional radiocarbon age and calibrated age of bone samples from Lofou-Kolaouzou (table C. Scirè Calabrisotto).