

## NEUTRON ACTIVATION ANALYSIS OF AEGEAN-STYLE IIIC POTTERY AT MAA: PALAEOKASTRO

The fortified settlement of Maa: Palaeokastro is situated on the west coast of Cyprus on a long promontory with a sheltered bay each side of it to the north and to the south offering protected harbours. Coastal plains extend 3-5 kilometres from the peninsular to the foothills of the Troodos Mountains.

The aim of the Maa project was to carry out chemical analysis in Bonn, with H.Mommsen, by Neutron Activation Analysis (NAA) of 30 pieces of 12<sup>th</sup> century BC Aegean-style pottery from Maa in order to obtain the chemical profile of the site. This would allow exchange of pottery between Maa and other Cypriot sites, with known chemical profiles, to be monitored and, most importantly, exports from Maa to the east Mediterranean might be identified, leading to illumination of maritime patterns. A particular desideratum was to see if a chemical group of pottery recently isolated by NAA at Tarsus came from Maa. The group should come archaeologically from west Cyprus, but its chemical profile did not match that of Kouklia, which did export pottery to Tarsus.

Surprisingly the analysis has isolated imports at Maa from five other Cypriot sites, but no recognisable chemical profile from the site itself. One group with seven members might represent the local profile, but it is not large enough to be convincing. Ten samples were assigned as Singles; that is they could not be associated to any known chemical group. This is a larger number of Singles than is usually found in 30 samples. It is the result of basalt, which is present all round the Troodos in the foothills, being used in the temper of the clay; other tempers, such as sand, can be filtered out, so that the variable chemical elements can be measured, but basalt cannot (Sterba *et al.* 2009).

Most of the imports to Maa were from Kouklia:Palaepaphos, the nearest large site round the south coast to the east. This was followed by two imports each from Hala Sultan Tekke and Kition/Hala Sultan Tekke and single imports from Alassa and Sinda (see Fig.1). The lack of a chemical profile at Maa and the recognition of the imports there from other Cypriot sites gives important new information on Cypriot maritime trade with particular reference to the copper industry.

### **The copper industry at the sites from which exports were found at Maa**

Kouklia, with most exports to Maa, is located in a coastal strip close to the delta of the Dhiarizos River; the Troodos Mountains rising behind it meant that communication would have been along the coast. Kouklia was a so-called gateway site in that copper mined and smelted in the pillow lavas in the foothills of the Troodos came down to it by various routes to be sent abroad (Iakovou 2012, 58; 2013, 285-87). Two chemical profiles have been isolated by NAA for Kouklia, CypG and CypS (Mountjoy and Mommsen 2015), the latter very similar to the former, but differing in having higher scandium and iron. Altogether there were six imports at Maa from both profiles, four from CypG and two from CypS; in addition there are two more Aegean-style IIIC imports belonging to the CypS profile resulting from an unpublished Maa NAA project carried out by R.Jung.

Continuing eastwards round the south coast, the next site with an export to Maa was Alassa in the Kouris river valley. The settlement at Alassa has been excavated at an upper and a lower site, about 250m. from each other. The upper site, Alassa: Palaiotaverna, had two large ashlar buildings and seems to have been a centre of regional administration. Numerous pithos fragments impressed with cylinder seals have been uncovered; seal impressions from these were found at the lower site, Pano Mandilaris (Hadjisavvas 1996, 32). Alassa was on the copper route running from the mines in the Troodos foothills down to the coast via Kourion: Bamboula. After primary smelting at the mine sites, the copper alloys would have been resmelted at Alassa (Hadjisavvas 1989, 40-41). The NAA samples to establish the chemical profile of Alassa, CypF, were taken from pottery from Pano Mandilaris (Mountjoy and Mommsen 2015, 448-51); however, the proximity of the upper and lower Alassa sites suggests the same clay source would have been used at both sites.

Continuing eastwards, the next site from which exports came to Maa was the busy port of Hala Sultan Tekke lying on the west side of the Larnaka Salt Lake, which provided a large sheltered harbour. Much copper working was carried out in the town, as large amounts of slag bear witness. Two large pictorial mugs found at Maa can be assigned to the chemical profile of Hala Sultan Tekke, CypT. They are fragmentary, but both seem to depict scenes of birds being eaten by monstrous fish. Pictorial III C mugs are not very common on Cyprus or elsewhere; these two are unique so far in their decoration (See Figs. 2 and 3).

Kition, situated across the Salt Lake from Hala Sultan Tekke, also had a good harbour. The north part of the town was built on a low plateau which runs parallel to the present coast line; the harbour lay south of a marshy region in a bay towards the north part of the plateau about 500m inland from the present coast line. It was connected to the sea by a navigable channel in the area of the temples of Area II (Karageorghis 1976, 14,94; Gifford 1985, 385 fig.4). Areas I and II, the two more fully excavated areas, revealed much copper working. CypJ, the profile assigned to Kition, is shared by samples from Kition and Hala Sultan Tekke. They could not be separated, possibly as the proximity of the clay sources used for this profile is geologically similar. CypJ definitely applies to Kition, as Proto-White Painted (PWP) pottery analysed belonged to CypJ; at the time PWP came into fashion Hala Sultan Tekke had been abandoned. It is possible that all the CypJ pottery belongs to Kition, partly because Hala Sultan Tekke has its own chemical profile, CypT, and partly because 16 Kition samples belonged to CypJ, but only eight Hala Sultan Tekke samples. However, CypT is not well enough represented to be considered as the main Hala Sultan Tekke chemical profile, since only six of the 30 Hala Sultan Tekke samples belong to it (Mountjoy and Mommsen 2015, 444 fig.11, 449 fig.15).

The last export to Maa is from the inland site of Sinda, which is situated in the Mesaoria Plain about 15km from Enkomi. It has been suggested that the function of this fortified site was to control the copper route from metallurgical sites in the foot hills of the Troodos to Enkomi by protecting the crossing of the Pedhieos River and the road along it (Adelman in Furumark and Adelman 2003, 66). Enkomi, which lay about 4km inland on the combined estuaries of the Pedhieos and Yalias rivers, had a port protected from the prevailing south winds. It was reached by a channel running inland from the Bay of Salamis (Howitt-Marshall 2012, 114).

The results of the NAA showed contact between Maa and all the main Cypriot sites except Enkomi. The absence of Enkomi may be fortuitous. All the sites are coastal or have good coastal contact except Sinda, from whence goods could have gone to Enkomi for shipment or

south to Kition. Transport to and from Maa would have been maritime, taking advantage of its double anchorage. The imported goods found at the site might suggest it was a prominent trading site within the island and/or an international harbour town. But this may not be the case.

*Did Maa produce its own fine ware pottery containers to trade for their contents?*

It does seem that Maa might not have produced its own fine ware pottery, as demonstrated by the present NAA analysis. An earlier analysis of the unpainted Plain White Wares has shown that they came from Enkomi, Kition and, in particular, Hala Sultan Tekke (Bryan *et al.* 1997, 56). Water might have been a problem for pottery production at Maa, although there were nearby springs which could have been used (Karageorghis and Demas 1988, 1-2 fig.1 with fn.1). Indeed, petrography and chemical analysis have shown that a very small number of so-called Canaanite jars were produced locally (Jones and Vaughan 1988). Nevertheless, for fine wares and their contents, Maa seems to have been dependent on external sources.

*Cabotage*

The fact that much of the pottery sampled from Maa came from other sites on the island, mostly coastal, suggests cabotage. Only in the case of nearby Kouklia, 26km away, which had a larger number of exports to Maa, might there have been a deliberate policy of sending pottery to it. It is also possible that the two opulent vessels from Hala Sultan Tekke might have been a special order for feasting or some other activity.

Furthermore, although the very few pieces of vessels of vitreous materials uncovered at Maa belonged to divergent types with a wide geographical spread covering Syria/Mesopotamia, Egypt and North Syria (Peltenburg 1988, 314-16), the number of vessels is minute. This again suggests cabotage.

*Was Maa a major metallurgical site or just carrying out metallurgy for local use?*

There is evidence of metallurgy at Maa (Zwicker 1988, Muhly and Maddin 1988), but it is generally accounted to be on a limited scale for local use based on the small amount of copper slag and copper artefacts present (J.Muhly pers.com. 27 Feb.2018; Karageorghis and Demas 1988, 262). Metallurgy does not seem to have been a prominent activity at the site.

*The presence of cylinder seal impressed pithoi and the use of the Egyptian weight system might suggest international contacts.*

Numerous fragments of cylinder seal impressed pithoi at Maa in Area III Building III Floor II have suggested extensive storage (Porada 1988, 301-13), leading to the identification of the north part of the building (Rooms 82, 84 and 85) as a storage depot for surplus agricultural products (Karageorghis and Demas 1988, 33-34). No petrography is mentioned, so it is unclear if the pithoi were locally produced or sent from Kouklia or elsewhere. These pithoi with rolled impressions have also been found at Alassa. They are part of an accounting system, which employed weights used in Near Eastern systems of metrology (Courtois 1984, 85). These weights are also present at Maa (Courtois 1988), as well as at Alassa and Kalavassos. However, the accounting system is an internal island accounting system; there need not have been direct international contact. Nevertheless, the presence of the storage

depot and the internal accounting system equate Maa to Kalavassos and Alassa, which had similar systems. These two sites were part of the copper production network.

*Do imported Syro-Palestinian amphorae, the so-called Canaanite jars, at Maa suggest international trade?*

The presence of large numbers of Canaanite jars at Maa might be evidence of international trade at the port. They have been assigned by petrography and chemical analysis (Atomic Absorption) as products of the central Levant and south Palestine, with just a few jars being locally produced (Hadjikosti 1988, 340-85; Jones and Vaughan 1988, 393). However, these jars may have been sent to Kouklia and forwarded on to Maa via Kouklia. Hadjikosti has already raised the question as to whether Maa imported the jars directly or whether they came from Kouklia: Palaepaphos or other island administrative centres (Hadjikosti 1988, 361). Whether they were sent from Kouklia or came directly, these containers might be part of the provisioning of the metallurgical sites in the west Troodos.

It seems Maa may well have been a satellite site of Kouklia: Palaepaphos, as has already been suggested (e.g. Keswani 2004, 155; Knapp 2008, 137). It could have provided agricultural surplus to the copper villages of the west Troodos, while itself being provided with fine ware pottery from Kouklia along with imported Canaanite jars, the contents of which might have been for Maa itself or for the copper villages. A very large number of the Canaanite jars on the Uluburun wreck contained resin (Pulak 1988, 10-12). Olive oil and honey are among other substances transported in these jars (Killebrew 2007, 182).

### *Copper mining*

The connections from the mining sites close to the cupriferous pillow lavas in the foothills of the Troodos, to the smelting sites, and then via particular routes to refining and port sites, required an infrastructure. It has been suggested that this was provided by inland centres storing and redistributing agricultural produce to both mining and coastal areas, as well as unpainted pottery, tools and raw materials (Keswani 1993; Knapp 2008, 166-67).

The present clay analysis by NAA and its forerunner (Mountjoy and Mommsen 2015) show that, within the context of these analyses, no Cypriot site received pottery imports from as many other Cypriot sites as did Maa. Apliki and Athienou are the next with imports from four sites. Apliki was a mining site and Athienou a smelting site. No chemical profile could be isolated by NAA for these two sites. These metallurgical sites may not have made their own fine decorated pottery, although they probably made coarse wares, such as crucibles. This has been demonstrated by petrography at the site of Kalavassos, for which also no chemical profile could be isolated. The petrography showed that the tuyères and crucibles matched the local coarse ware pottery (L. Van Brempt, work in progress). Fine ware pots might have been sent to the metallurgical sites along with food and other products. Maa, another site for which no chemical profile could be achieved, may not have produced its own fine ware pots, but may have been sent them as part of its role as a support site.

To return to the question of whether it was an international trading site. Was copper actually shipped from Maa?

## *The maritime angle*

### **Kouklia harbour**

Kouklia today is an inland site. The harbour is thought to have been situated east of the Sanctuary at Loures, which would have been a protected cove at that time but is now buried under silt from the Dhiarizos river (Iacovou 2008, 271; 2012, 62-64; 2013, 285-87). It is clear that the area of Kouklia conducted maritime trade, as NAA has shown that Kouklia was the most prominent exporter of pottery and its contents internally round the island as well as being the second largest exporter to the Levant after Kition/Hala Sultan Tekke (Mountjoy and Mommsen 2015).

An anchorage south of Kouklia, at Kouklia: Achni, has recently been located (Howitt-Marshall 2012). 120 stone anchors were recorded on the sea bed, consisting of 96 single-holed and 24 three-holed types broadly consistent with examples found in Middle/Late Bronze Age and Early Iron Age contexts. This is currently the second largest collection of stone anchors at a single site in the eastern Mediterranean and doubles the number of known examples found in Cypriot waters. As such, Howitt-Marshall has suggested that, in spite of its exposed position, Achni was a major maritime terminus for the west coast from the MBA onwards, where maritime traffic from the Levant and elsewhere in Cyprus off-loaded trade goods (Howitt-Marshall 2012, 113, 116-17). Nearby Kouklia: Palaepaphos was one of the few sites on the island not to collapse following widespread destruction and abandonment at the end of the LBA. It is reasonable to assume, therefore, that the anchorage at Achni continued to function as a maritime terminus well into the EIA before silting-up with alluvium from the nearby Dhiarizos River.

### **Anchorage at Maa**

The peninsula of Maa is flanked by a bay to the north and to the south. The long shore drift running down the coast from the north would have silted up the northern bay, rendering it too shallow for deep-hulled vessels, but the southern bay with its long, protected beach could have been the main harbour of Maa. Normally, shipping went anti-clockwise round the island due to the prevailing winds and currents (Howitt-Marshall 2012, 113) which, if Maa was a satellite site of Kouklia, would have made communication difficult. However, shipping could have travelled north-west from Kouklia to Maa, since the Akamas Promontory cuts off the prevailing north-west wind. In like manner, shipping could also have travelled westward along the south coast from Kition/Hala Sultan Tekke to Kouklia, as the prevailing north-west winds are blocked by the position of the island and the currents are weaker. There were also localised winds which would have blown in different directions at different times of the year.

In sum, deep hulled ships could have stopped at Maa and loaded up with copper products to go westwards. Alternatively, copper was loaded at Kouklia to go west or east and Maa was purely a support site for the metallurgical sites. It is unclear how the copper was divided up at a main port to be shipped on; it may have been necessary for all that from the area to be gathered at Kouklia. However, whether copper going west was loaded at Maa or not, Maa was the last port of call where water and supplies (perhaps in Canaanite jars?) could be taken on board before crossing the open sea to the Aegean.

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