Torbjörn Brorsson

Analyses of pottery from Area A, B and C at Monte Polizzo, Sicily. Pottery from the 6th century BC. - Ware analyses and chemical analyses



Ceramic Studies, Sweden Report 14, 2007

The reports from Ceramic Studies, Sweden/KKS are printed in a limited edition. Please contact Ceramic Studies for a free copy in pdf or as a printed version. Ceramic Studies, Sweden, Vadensjövägen 150, S-261 91 Landskrona, Sweden or torbjorn.brorsson@ceramicstudies.se www.keramiskastudier.se
Vadensjö 2007
2

Introduction	p. 5
Material	p. 5
Aims and questions	p. 6
Methods	p. 7
Analyses	p. 7
Ware analyses	p. 7
Chemical analyses	p. 8
Interpretation	p. 9
Literature	p. 11

Introduction

During the years between 1998 and 2006 archaeological excavations were carried out at Monte Polizzo in the Trapani province in western Sicily (Fig. 1). The excavation concerned were performed at three locations, area A, B and C, tentatively dated to the mid. 6th century BC. (Mühlenbock & Prescott 2004).

The project, concerning the settlement at Monte Polizzo, is part of a bigger project, "The Emergence of European Communities; Household, Settlement and Territory in the Later Prehistory" (Kristiansen 2002). The project is mainly financed by Riksbankens Jubileumsfond. And Enboms Fond, Svenska Vitterhetsakademien.

The analyses of the pottery from the excavations were financed by Birgit och Gad Rausings stiftelse för humanistisk forskning. Christian Mühlenbock at the department of Archaeology at the university in Gothenburg was head of the excavation at Monte Polizzo.

In order to gain as much as possible of the pottery and the ceramic craft different analyses were performed. The analyses are complement to the conventional archaeological study and interpretation. However, the natural science analyses may answer different questions on the pottery and the craft, which the bare eye cannot.

In 2005 an article dealing with neutron activation of pot shards dated to the 5th century BC from different sites in western Sicily was published (Kolb & Speakman 2005). The main result of the study was that the ceramic manufacture in western Sicily was organised on a regional basis, yes certain patterns of intra-group trade did exist. Another study of the pottery was made in 2005 (Brorsson & Sköld 2005). This study was focused on the technological aspects of the vessel, which indicates how the vessels were produced and which raw materials that were used. The main result was that several different ware groups were identified and that different vessel types were made by different clays.

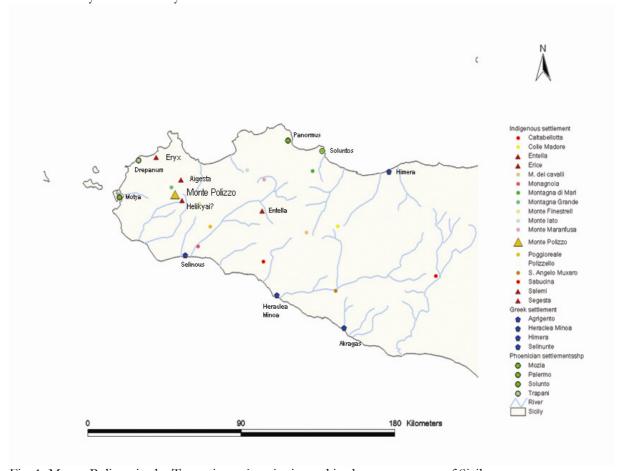


Fig. 1. Monte Polizzo in the Trapani province is situated in the western part of Sicily.

Material

A total of 20 shards were sampled for different analyses (table I). The material has been found within three different areas of at least four different houses located in area A-C. Most of the analysed shards were found in area A.

A majority of the shards have been interpreted as local made or so called indigenous grey ware. The shards in this group are called local, indigenous or MP-ware. The latter is a coarse local ware, which is very common in the area. One shard may be from presence France and another from Greece (Corinth). Two shards have foreign influence, which is one shard of Mycenaean and one Etruscan. These shards may be imported, but as well be local copies.

The sample consists of different vessel functions. These are bowls, cups, an amphora, table amphoras, a globular pot and a hydria for water. One clay brick, which may have been used as a stamp for textile was also sampled for analyses.

Aims and questions

Several questions of the pottery have been raised during the excavation and after the preliminary study of the shards.

The main question is to examine how the different vessel types were made. Which type of clay and temper were used? Are all the indigenous or local pots made in the same way? Are the examined samples of vessels found at different locations at the site produced at the same location?

Another question is to examine the origin of the vessels. Are the shards which are interpreted as foreign made of different raw materials than the local ones?

Are different ware types representing different vessels functions? A coarse ware is normally more suitable for cooking, and a fine ware was most likely used for serving.

Table I. Analysed pottery shards from Monte Polizzo, Sicily.

Thin section	Area	Vessel	Origin	Vessel function
1	Α	Globular pot	Indigenous	Storage/Cup
2	Α		Import?	
3	Α	Bowl	MP ware	For food
4	Α	Bowl		Liquids
5	Α	Bowl	Import?	Ritual
6	Α	Cup	Etruscan influence	Cup
7	Α	Clay brick	Indigenous	Stamp
8	Α	Cup	Mycenian influence	Ritual/Cup
9	С	Bowl	MP ware	Liquids
10	В	Bowl	Indigenous	Liquids
11	Α		Uncertain	
12	Α	Bowl	Indigenous	Liquids
13	Α	Hydria	MP ware	Liquids
14	Α	Bowl	Colonial origin	For food
15	Α	Table amphora	Corinth	Liquids
16	Α	Amphora	Indigenous	Liquids/food
17	Α	Bowl	Indigenous	Ceremonial
18	Α	Bowl	Indigenous	Liquids
19	Α	Cup	Indigenous	Liquids
20	Α	Table amphora	MP ware	Liquids

Methods

A total of 20 thin sections of potshards have been studied under a polarising microscope at magnifications between 25 xs and 630 xs, in parallel as well as in polarised light. The analyses of the thin sections were made by Torbjörn Brorsson at Ceramic Studies in Landskrona, Sweden and a mineralogical examination of the thin sections have been carried out by Christina Lundmark at the Geology Survey of Sweden in Malå. Chemical analyses of 16 shards were carried out by OMAC-laboratories in Galway on Ireland.

Microscopy under polarising microscope: Thin sections were made from each one of the selected shards. In order to be used for comparative studies a thin section is made according to a standardised thickness of exactly 0.03 mm. In a polarising microscope it is possible to identify minerals in the silt- and sand fractions. The microscopy is not only a petrographic study, but it also involves other aspects of the pottery craft. It is possible to study different structures in the ware, such as vessel forming techniques, clay type, to distinguish added and natural temper as well as the amount and grain size of this material, organic matter e.g. diatoms and plant material etc. Particular observations of specific minerals and other features of the temper and clay have been noted. Shards with the same type of clay and temper are most likely from the same production area.

Chemical analysis by ICP-AES: A chemical analysis decides the shards chemical identity, and 17 shards were selected to the ICP (Inductively Coupled Plasma) analysis. The chemical analyses can be used to point out the geographical origin of the pottery.

The selected shards (minimum 1 g) are grinded to a fine powder and solved in a 4-acid solution. These solutions are injected into excited argon plasma. When atoms are exposed to energy the electrons change and rechange orbits, causing a coloured light (emission spectra) that can be measured by AES – Atomic Emission Spectrometry.

X minerals and trace elements where measured, and the frequency is shown in table III.

Analyses

Ware analyses

In 2005 altogether 21 shards were analysed. The shards were divided into seven groups, named I-VII. The groups consisted of different clays and temper materials:

Group I: Fine clay without any added temper

Group II: Fine clay with sand tempering

Group III: Fine clay with grog tempering

Group IV: Medium coarse clay without any added temper

Group V: Medium coarse clay with grog tempering

Group VI: Coarse clay without any added temper

Group VII: Coarse clay with grog tempering

The 20 analysed shards of the present analyse can accord to the result in table II be divided into four groups out of the seven groups from 2005. The classification is based on the type of clay and temper.

Group I contains of one shard (Thin section No. 16). The vessel was made of fine clay without any added temper. The main mineral in the clay is quartz. Maximum grain has been measured to between 0.3 mm.

The shard belongs to an indigenous amphora.

Group III contains of altogether three shards (Thin section Nos. 7, 11, 15). The vessels were made out fine clay, which was tempered with e few percents of grog. Maximum grain in the wares has been measured to 0.3 mm. The main minerals in the clays are quartz and mica.

The shards belong to a Corinthian table amphora, a clay brick and an uncertain vessel of uncertain origin.

Group IV contains of three shards (Thin section Nos. 1, 13, 20). The vessels were made out of medium coarse clay without any added temper. Maximum grain has been measured to between 0.3 and 0.5 mm. The main mineral in the wares are quartz.

The shards in the group belong to a globular pot, a table amphora and a hydria. The vessels were most likely of local origin.

Group VI is the largest group and contains of 13 shards (Thin section Nos. 2, 3, 4, 5, 6, 8, 9, 10, 12, 14, 17, 18, 19). The vessels were made out of a coarse clay without any added temper. Maximum grains have been measured to between 0.3 and 0.8 mm. The main mineral in the wares are quartz.

The shards mostly belong to bowls and cups of local origin. There are two shards of Etruscan respectively Mycenaean influence.

Table II. Results of microscopy of ceramic thin sections from Monte Polizzo. Abbreviations: ++=very rich amount, +=rich amount, *=normal amount, -=low amount, x=presence, n.o= not observed

Thin section	Origin	Vessel type	Ware group	Sorted (S) / Unsorted (U)	Fine / Medium coarse / Coarse	Sand	Silt	Mica	lron oxide	Iron hydroxide	Diatoms	Organic material	Calcium carboante	Temper material	Temper amount	Maximum grain size	Notes
1	Indigenous	Globular pot	IV	U	Medium coarse	х	Х	*	+	Х	n.o.			Natural		0.5	
2	Import?		VI	J	Coarse	х	Х	*	+	Х	n.o.			Natural		0.8	
3	MP ware	Bowl	VI	J	Coarse	х	Х	+	+	Х	n.o.			Natural		0.5	
4		Bowl	VI	U	Coarse	х	Х	n.o.	+	Х	n.o.			Natural		0.5	
5	Import?	Bowl	VI	U	Coarse	х	Х	+	+	Х	n.o.			Natural		0.5	
6	Etruscan influence	Cup	VI	U	Coarse	х	Х	+	+	Х	n.o.			Natural		0.5	
7	Indigenous	Clay brick	III	S	Fine		Х	*	+	Х	n.o.			Grog		0.3	
8	Mycenian influence	Cup	VI	U	Coarse	х	Х	+	+	Х	n.o.			Natural		0.3	
9	MP ware	Bowl	VI	U	Coarse	х	Х	+	+	Х	n.o.			Natural		0.5	
10	Indigenous	Bowl	VI	U	Coarse	х	Х	*	+	Х	n.o.			Natural		8.0	
11	Uncertain		III	S	Fine		Х	++	+	Х	n.o.			Grog		0.3	
12	Indigenous	Bowl	VI	U	Coarse	х	Х	*	+	Х	n.o.			Natural		0.3	
13	MP ware	Hydria	IV	S	Medium coarse		Х	*	+	Х	n.o.			Natural		0.3	
14	Colonial origin	Bowl	VI	U	Coarse	х	Х	+	+	Х	n.o.			Natural		0.3	
15	Corinth	Table amphora	III	S	Fine		Х	n.o.	n.o.	n.o.	n.o.			Grog		0.3	Sintered
16	Indigenous	Amphora	-	S	Fine		Х	*	n.o.	n.o.	n.o.			Natural		0.3	
17	Indigenous	Bowl	VI	U	Coarse	Х	Х	++	+	Х	n.o.			Natural		0.5	
18	Indigenous	Bowl	VI	U	Coarse	Х	Х	*	+	Х	n.o.			Natural		0.5	
19	Indigenous	Cup	VI	U	Coarse	Х	Х	*	+	Х	n.o.			Natural		0.3	
20	MP ware	Table amphora	IV	U	Medium coarse	Х	Х	n.o.	n.o.	n.o.	n.o.			Natural		0.5	

Chemical analyses

From the ceramic material of Monte Polizzo 16 samples were selected for chemical analysis. The chemical analysis determines the level of 58 elements, which gives additional information on the origin and use of the vessel (Tab. III).

Only few of the samples show significant variations. Sample 15 is the most unique, with very high level of Ca, Sr and Zr, high level of As, Mg and S, and low level of K and Zn. Sample 14 contains a higher level of silver, but not high enough to indicate silver craft. Sample 16

is also different with high level of Al, Cr, K and Mn.

The other samples show very small variations, which means that they share to a large extent.

The other samples show very small variations, which means that they share, to a large extent, origin.

Table III. The chemical analyses	of the pottery from	Monte Polizzo Only	y the major elements are
presented in the table.			

P																				
SAMPLE	Ag	Al	As	Ca	Cr	Cu	Fe	Ga	K	Li	Mg	Mn	Na	Nb	Р	S	Sr	Υ	Zn	Zr
	ppm	%	ppm	%	ppm	ppm	%	%	ppm	ppm	ppm	ppm								
1	<.5	8,03	12	1,49	107	19	4,90	20	1,20	40	1,00	371	0,23	18	0,068	0,02	109	18	110	79
2	<.5	8,33	15	1,12	112	25	4,96	17	0,88	32	0,50	242	0,21	23	0,067	0,01	82	17	115	91
3	<.5	7,48	10	1,65	99	18	4,13	16	1,15	35	0,63	281	0,24	17	0,070	0,01	95	15	90	83
4	<.5	6,94	11	0,85	89	19	4,14	15	0,93	27	0,37	160	0,17	17	0,077	0,01	55	16	87	90
5	<.5	6,78	9	1,05	93	19	4,06	15	0,65	31	0,60	330	0,20	14	0,069	0,01	53	14	94	69
6	<.5	6,84	9	1,23	93	21	3,99	13	0,87	31	0,46	306	0,21	17	0,090	0,02	82	15	99	71
7	<.5	8,30	13	1,09	107	24	4,57	21	1,19	55	0,94	296	0,24	17	0,065	0,02	78	17	103	89
8	<.5	7,03	11	1,15	96	19	4,19	13	0,76	31	0,43	195	0,21	18	0,068	0,02	63	14	89	73
9	<.5	7,33	11	0,75	96	23	4,10	14	0,85	30	0,30	245	0,17	17	0,070	0,02	46	17	80	76
14	1,3	7,12	10	0,82	98	18	4,13	15	1,15	51	0,64	384	0,36	16	0,079	0,01	59	16	107	77
15	<.5	8,50	21	9,22	124	16	4,78	17	0,40	29	1,16	317	0,29	21	0,162	0,03	843	21	37	236
16	<.5	9,23	13	3,79	133	16	5,11	22	1,44	44	1,52	466	0,49	22	0,097	0,07	229	18	137	100
17	<.5	7,29	13	2,08	102	23	4,29	15	1,08	39	0,77	372	0,31	15	0,117	0,02	120	15	105	76
18	<.5	6,14	10	1,30	81	22	3,52	14	1,00	43	0,69	263	0,25	15	0,059	0,01	63	12	86	73
19	<.5	6,34	9	0,96	85	26	3,66	13	1,04	37	0,58	238	0,30	14	0,065	0,02	73	14	91	70
20	<.5	6,86	19	7,35	90	17	3,63	16	1,55	33	0,97	312	0,45	16	0,137	0,05	428	16	90	81

Interpretation

The combination of a chemical and a ware analyses shows that at least one shard belonged to an imported vessel, which is thin section No. 15. The archaeological interpretation of the shard is that it was made in Corinth, and the analyses confirm a foreign origin. The chemical analyses indicate that two other shards may have been of foreign origin, which are Nos. 14 and 16. However, No. 14 is archaeologically interpreted as a local pot, and the ware analyse confirms this hypothesis. The large amount of especially silver in the ware may have been the result of the vessel function. But, the vessel has most likely not been used for metal craft. Thin section No. 16 has been interpreted as a local table amphora. The ware analyse confirms that the vessel is unique in the material. It was made by a fine without any added temper. The amphora may have been made by a clay that was rare on Sicily. Perhaps the clay was used for a specific type of vessels or/and by an exclusive ceramic workshop on the Island. The pot that may have been made in France (Thin section No. 2) is most likely of local Sicilian origin.

The shards of which are interpreted as local made are also more or less made in the same way. The chemical analyses show a common origin, and only a few ware types appear. The reason why different clays and temper materials were used was most likely the result of different vessel functions. A globular pot, a amphora, a table amphora, a clay brick and a hydria was made by either a fine clay or a medium coarse clay. The big group of bowls and cups were made by coarse clays. This result confirms more or less the previous ware analyses made in 2005 (Brorsson & Sköld 2005).

The pots of which is of Mycenaean respectively Etruscan influence are also most likely made on Sicily. The chemical analyses as well as the ware analyses confirm a local origin. The vessels were made by same methods as the rest of the analysed material from Monte Polizzo.

The study of the pottery from Monte Polizzo confirms the analyses made in 2005. The pottery craft in the region was an advanced and specialised handicraft. The vessels were made of different raw materials and the reason for this was most likely affected by the vessels function. Further more, thermal analyses made in 2005 showed that most of the local pottery was fired to between 500 and 600°C, which are rather low temperatures for ceramic material, but enough for a vessel. It indicates that the craftsmen were very skilled and they did not use more fuel than necessary. The fuel was most likely forests on Sicily.

The analysed pottery from Monte Polizzo constitutes a picture of its society and exchange between different regions in the Mediterranean. The pottery has been used as one major factor to the interpretation of the people that lived at Monte Polizzo for 2500 years ago.

The impression from the two pottery analyses performed shows that:

- Different clays and more importantly different temper materials are used depending on the vessel function.
- The table amphorae are generally produced out of fine clay with grog tempering, grog referring to small pieces of ceramics. This is probably in order for the pottery to be more durable.
- -Corinthian and Ionic imports can be separated from the local production because they are often produced with fine clay without any added tempering. They are also generally fired at higher temperatures, over 1000°C, which possibly indicate higher qualities of the kilns and abundance of firing wood. One bowl and a storage vessel of indigenous origin were also fired at the same temperatures which possibly indicate that the temperature used was not stable.
- One imported assumed Corinthian table amphora had a completely different chemical composition than the rest of the material.
- One grey ware vessel table amphora with breast, were most likely produced at another indigenous centre. A similar table amphora has also been found at Monte Maranfusa in western Sicily.
- Most of the indigenous produced vessels were fired between 550-600°C which then means that the minimum amount of firing wood was used to produce these vessels. The vessels were probably produced in kilns.
- 18 indigenous bowls were analysed. All of them were produced using coarse clay without any tempering. Which indicates a similar production method, and possibly also the same place of origin.
- 12 Indigenous bowls/cups were targets for a chemical analysis and they all showed the similar chemical composition.
- This indicates that even the more ritual version like the assumed French, the goblet and the large type 1 bowl and the small ritual bowl all were produced locally, possibly at Monte Polizzo.
- All analysed type 1 bowls, except the one identified as a yellow colour significant for the Greek colonies or possibly Corinth, were produced locally.
- The imported type 1 bowl had the same manufacture sequence of an untempered coarse clay, but the chemical analysis singles it out.
- The only exception to the above mentioned bowls is a possible bowl with an unusual pattern, this shard was made out of fine clay with grog tempering, possibly indicating an earlier phase of production.
- The similarities between the indigenous pottery craft visible in the ware analysis indicates that the production line were quite similar when it came to choosing specific clays for specific functions. This is most obvious in the case of the No. 14 bowl which has the exact same composition of clay while the chemical composition is quite different from the others. The indigenous potters did thus not only copy the shape, but they did also use virtually the same production technique. This can possibly indicate that they learned the craft directly from the Greek colonists, or that they had visiting Greek potters helping out in the settlement.

It does therefore seem like all the bowls and cups designated to the MP ware indeed was produced at the site. The production centre did produce bowls of various patterns and forms. Some bowls were made differently possibly indicating a more ritual character. They contained motives which are included into the general iron-age assemblage of patterns but the patterns are often limited to a few vessel types. The typical denta di lupo patterns are the most common type of extraordinary design motive in relation to single lines or triple lines along the rim of the typical type 1 bowls. The potters did also improvise occasionally in combining the

elements of form or rim, handle and body into new forms. These pieces are often unique and some of them have been found in odd contexts. The overall impression is therefore that the local potters had a standardized scheme but they were also free to create bowls and vessels into new forms, sometimes copying imports like the imported type 1 bowl. Some of these vessels were then turned into a more standardized repertoire of vessels where some were exported. A typicl denta di lupo bowl has for example been found in Selinunte in southwestern Sicily.

Literature

Brorsson, T. & Sköld, P. 2005. Technological analyses of pottery from house 1 at Monte Polizzo, Sicily. Report from the Laboratory for Ceramic Research, Lund University.

Kolb, M. J. & Speakman, R. J. 2005. Elymian regional interaction in Iron Age western Sicily: a preliminary neutron activation study of incised/impressed tablewares. *Journal of Archaeological Science* 32, p. 795-804.

Kristiansen, K. 2002. The Emergence of European Communities; Household, Settlement and Territory in the Later Prehistory. An application to Riksbankens Jubileumsfond by Goteborg's Universitet, Department of archaeology. Göteborg 2002

Mühlenbock, C. & Prescott, C. 2004. House 1. Scandinavian-Sicilian Archaeological project. Annual Report 1999-2000.

Report from Ceramic, Studies, Sweden / Kontoret för Keramiska Studier

Nr 1	Godsanalys av keramik från sju lokaler inom Naturgasprojektet i Bohuslän, samt från Tega
	Prästgård i Ytterby sn. – en studie av framställningsteknik och kärlgods under senneolitikum, yngre
	bronsålder och äldre järnålder.
Nr 2	Godsanalys av tredje gruppens keramik – en studie av keramik från Torslunda, Tierp sn, Uppland
Nr 3	Lerbottnar från 1100- och 1200-talen. Analys av råleror som ett bidrag till lerbottnars funktion.
	Kv. Liljan, Malmö, Skåne
Nr 4	Gudomliga skärvor – en inblick i ett andligt mellanneolitikum. Analys av keramik från gånggriften i
	Västra Hoby, Kävlinge, Skåne
Nr 5	Termiska analyser av bränd lera från ugnar i Norra Hyllievång, Malmö, Skåne
Nr 6	Hällristningens keramik – en inblick i keramiken från hällristningen samt boplatsen i Tossene,
	Tossene sn. Sotenäs kn, Bohuslän
Nr 7	Termiska analyser av sandprover från gravfältet i Odberg, Larvik kommun, Vestfold, Norge
Nr 8	A Scandinavian pot from a grave at the Viking age settlement Timerevo, Russia
	- a study of the ware as a contribution to the interpretation of the pot
Nr 9	Täljstensmagrad keramik från Rämne i Bohuslän
Nr 10	Vikingatida keramik från Säby, Vintrosa sn. Närke - Analys av kärlgods från fyra krukor
Nr 11	Klockbägarkeramik från Bejsebakken, Aalborg, Danmark. Analys av gods och hantverksteknologi.
Nr 12	Keramik från Gyllins Trädgårdar, Husie, Malmö. En studie av keramik från övergången mellan
	tidig- och mellanneolitikum samt förromersk järnålder.
	Termiska analyser
	Konserveringsrapport
Nr 13	Gropkeramik från Strålsjön i Nacka sn. Södermanland. Analys av kärlgods och lokal rålera.
Nr 14	Analyses of pottery from Area A, B and C at Monte Polizzo, Sicily. Pottery from the 6th century BC.
	- Ware analyses and chemical analyses