

MARIA TRAPICHLER – ROMAN SAUER

The Black Glaze Ware of Velia

Introduction

Although no kilns had been found up to now, we can assume that Black Glaze ware was produced at Velia on the basis of few misfired pieces at least for the Late Classic to the Early Hellenistic periods. The best evidence is a staple of baked *skyphoi* or *cup skyphoi* published by R. Maffetone,¹ but their find spot within the city area is unclear. Some spacer rings and a misfired ring foot of a bowl were found in debris layers of the 4th c. B.C.E. in the Eastern quarter of the city (area of Vignale).² The identification of the local production among various fabrics of black-glaze pottery from Archaic to Hellenistic times was achieved by means of archaeological fabric analysis, accompanied by archaeometric analysis of selected samples of each fabric. The attribution to the local production is based upon the comparison of pottery and raw materials.³

By the study of the morphological development of vessels of Black Glaze ware,⁴ identified as local, we were able to distinguish a set of vessels, belonging to a service, consisting of closed vessels and vessels for drinking and dining (bowls, plates and small bowls). They display a continuous development from the first half of the 5th (pottery phase B2) to the end of 3rd/beginning of the 2nd c. B.C.E. (pottery phase E) and allow us to recognize characteristics that seem to be peculiar for the Velinian production.

Shapes with similar characteristics are, however, also found in fabrics which are very similar to local fabrics, but present a weakly calcareous groundmass.⁵ Thus a provenance from either the territory of Velia or – maybe more likely – the territory of Paestum is assumed, but also a production at Velia itself cannot be excluded at the actual state of research. It can be observed that samples in these fabrics (VEL-REG-G-1, PAE-REG-G-1 and PAE-REG-G-2) become more frequent from the 4th c. B.C.E. onwards.

¹ Maffetone 1999, fig.12, cat. 30-1.

² Trapichler 2006, cat. C3.136; inv. 10025/97; misfired ring foot of bowl: Trapichler 2006, cat. C1.91.

³ See supra, chapter by R. Sauer.

⁴ The topic has also recently been dealt with in Gassner et al. 2014.

⁵ Mainly the petrographic types RVG04a and RVG05, see chapter by R. Sauer in this contribution.

The fabrics of Black Glaze Ware of Velia

Macroscopic Description of Fabrics of the local production of Velia⁶

Samples of Black Glaze pottery stem to the greater part from contexts of the first and second half of the 5th c. B.C.E. (see annex 1).⁷ Additionally in the course of the study of materials from the crossroad in front of the later Insula II 78 samples from Black Glaze ware from contexts dating to the second half of the 5th c. B.C.E. were taken and here for the first time four fabrics could be identified as local by their characteristic composition and the clear absence of carbonates.⁸

The fabrics VEL-G-1 to VEL-G-4 are arranged from fine to coarse. Their color is in general reddish yellow with slight differences in color shades. VEL-G-2, fired under reduced atmosphere, shows no visible inclusions except occasionally some white mica.⁹ The coarser fabrics VEL-G-3 and VEL-G-4 present a more granular appearance. Occasionally some tiny white or dark particles are even visible to the naked eye. VEL-G-4 often displays a more or less marked grey core.

VEL-G-1

Reference sample: M2/102; Further samples: M2/49; M2/61; M2/62; M2/63; M2/64; M2/100; M2/105; M2/109; M5/5 (RVG01)

The matrix is reddish yellow (5YR5/8), its fracture fine grained and smooth. It contains some white mica. Voids are rare and small. Inclusions are rare, sometimes tiny particles of white or clear quartz and black inclusions (iron oxide concretions) are visible.

VEL-G-2

Reference sample: M2/92; Further samples: M2/90; M2/91; M2/122; M2/123; M2/124 (RVG01a and RVG02)

The fabric differs from VEL-G-1 by the color of its fracture, which is grey due to reduced firing or maintains a yellow reddish core (7.5YR5/6 to 10YR5/1). The fracture is fine grained or smooth, it contains some white mica. Inclusions are very rare; very seldom tiny white and

⁶ For a more detailed description see www.facem.at: VEL-G-1 to VEL-G-4.

⁷ 58 samples, see Gassner 2003, 39-40 with fabrics G1-6. None of these fabrics was, however, local.

⁸ These fabrics appear now in FACEM as VEL-G-1 to VEL-G-4.

⁹ These characteristics are also shared by VEL-C-1 in the Common Ware.

clear quartz particles as well as reddish brown and black particles (probably iron oxide concretions) do occur.

VEL-G-3

Reference sample: M2/79; Further samples: M2/80; M2/125 (RVG02 and 02a)

The matrix is reddish yellow (7.5YR6/6), the fracture more granular than in VEL-G-1 or VEL-G-2. Voids appear more often and the fabric may contain much white mica. Among the inclusions, which are sometimes visible to the naked eye as dark or white spots, are reddish brown or grey to black iron-oxide concretions, less frequent occurs white or clear quartz.

VEL-G-4

Reference sample: M2/26; Further samples: M2/27; M2/82; M2/83; M2/85 (RVG02)

The matrix is yellowish red (7.5YR5/8), the core being sometimes grey, it contains some mica. Among the inclusions occur most frequently white and clear quartz particles, which are sometimes visible to the naked eye. Reddish brown and black iron-oxide concretions appear frequently.

Macroscopic Description of fabrics from the territory of Velia and/or Paestum

Some fabrics were very similar to the fabrics described above, but showed a discrete amount of carbonate pseudomorph-moulds and thus their origin could be assumed in the surroundings of Velia or even Paestum.

One fabric was denominated VEL-REG-G-1, because it was very similar to VEL-G-1.¹⁰ Two fabrics appeared when studying the material of the 4th c. B.C.E. (pottery phase C). Macroscopically they show great similarities with VEL-G-1 and VEL-G-3, but contain a varying content of carbonates, that appear as carbonate-pseudomorphs of various sorts. As the percentage of carbonate resp. carbonate-pseudomorphs is slightly higher than in VEL-G-1 an origin in the territory of Paestum seems more probable and they were attributed there. Unfortunately, at the actual state of research none of these fabrics can be attributed with certainty either to the production of Velia and its territory or to the production of Paestum to which they show some similarities as well, especially to types with relatively low

¹⁰ It has to be noted that this fabric can easily be mixed up with the VEL-G-1, even when using a binocular.

carbonate content.¹¹ It is not even certain, if these products really come from a workshop in the territory or if Velinian potters started to exploit new clay outcroppings not used before.¹² The fabrics VEL-REG-G-1, PAE-REG-G-1, and PAE-REG-G-2 are very similar to VEL-G-1 and VEL-G-3. Their color is reddish yellow with slight differences in color shades. They contain a decent and slightly varying amount of carbonate pseudomorph-moulds and are arranged here according to the frequency of the occurrence of carbonates.

VEL-REG-G-1

Samples : M2/76; M2/81; M2/115 (RVG04).

The matrix is reddish yellow (5YR-5/5), its fracture granular. In contrast to fabric VEL-G-3 it contains a decent amount of carbonate pseudomorph-moulds. Voids appear more often, the fabric may contain some white mica. Among the inclusions, which are sometimes visible to the naked eye, most characteristic are reddish brown and dark grey particles (iron-oxide-concretions) and occasionally white or clear quartz.

PAE-REG-G-1

Reference sample: M2/131 (RVG04a)

The groundmass is reddish yellow (5YR6/6), the fracture is finer grained than VEL-REG-G-1 and contains some white mica and occasionally carbonate pseudomorph-moulds. Among the inclusions dominate very small reddish brown particles and seldom black inclusions (iron oxide-concretions), white and clear quartz particles appear less frequent.

PAE-REG-G-2

Reference sample: M2/130 (RVG04a)

The groundmass is reddish yellow (7.5YR7/4) and granular, it contains mica and a decent amount of carbonate pseudomorph-moulds. Among the inclusions are black and red particles (iron-oxide-concretions) and some white or clear quartz particles.

Glosses

Vessels of both the local and the regional production normally display glosses, which are not uniform and can also be observed on examples from Poseidonia/Paestum. The glosses are in

¹¹ Petrographic type RVG04a, see contribution by R. Sauer.

¹² For the chronology of this production see the next chapter in this contribution.

general of good quality adhering well to the surface of the vases. The colours vary from dark grey to shades of red and brown. A reddish yellow gloss is often observed with partially glazed forms like small jugs and one-handled cups. A dark grey gloss with a metallic shine often described as typical for Paestan products often also appears with fabric VEL-G-3.

The typological development of Black Glazed Ware at Velia

The main problem for the definition of the morphology of the local production is presented by the bad conservation of the vessels: as most of the pieces stem from debris layers in the settlement area, they are preserved only as – often small – fragments. Complete vessels are nearly absent as the material from the necropolis of Velia is yet unknown.¹³ For the reconstruction of most of the shapes we therefore can rely only on rim-, base- and handle-fragments. Thus, while we used the terms and the typology published by Sparkes and Talcott for the Attic examples,¹⁴ for the classification of the morphological spectrum of the local and regional productions we first developed a typology of rims and bases. Only in a second step we made proposals for whole vessel shapes, mostly in analogy to those known from Athens and the neighboring city Poseidonia resp. tried to fit them into the typology of Morel.¹⁵

Pottery phase B (470 – 400 B.C.E.)

The beginnings of a clearly defined local production can be observed only in phase B2, this is approximately from the mid of the 5th c. B.C.E. onwards.¹⁶ The shapes are inspired by Attic and Paestan models, but develop peculiar characteristics that can be traced throughout phases B and C, coming to an end eventually in phase D2 about the middle of the 3rd c. B.C.E. At the early stage of phase B, however, the amount of local production remains very modest with an approximate percentage of 15% of the total of Black Glaze ware in the studied contexts. The greater part is formed by Paestan (39%) and Attic products (26%, see fig.1), only in phase B3 in the last quarter of the 5th and at the beginning of the 4th c. B.C.E. we see the duplication of the local production to 30% (see fig.2).

¹³ The necropolis of Velia are mentioned frequently in the studies of the XVIII and early XIX c. B.C.E., see Vecchio 2012, 615-18, but they were not excavated with scientific methods., with exception of the Roman necropolis in front of the Porta Marina Sud, see Fiammenghi 2005.

¹⁴ Sparkes and Talcott 1970.

¹⁵ Morel 1981.

¹⁶ For isolated examples of the fabric VEL-G-4 in Phase B1 see the table of samples e. g. nos. M2/26 (Gassner 2003, IIa.90); M2/27 (Gassner 2003, IIa.82); for a discussion of the problem see also Gassner and Trapichler (forthcoming).

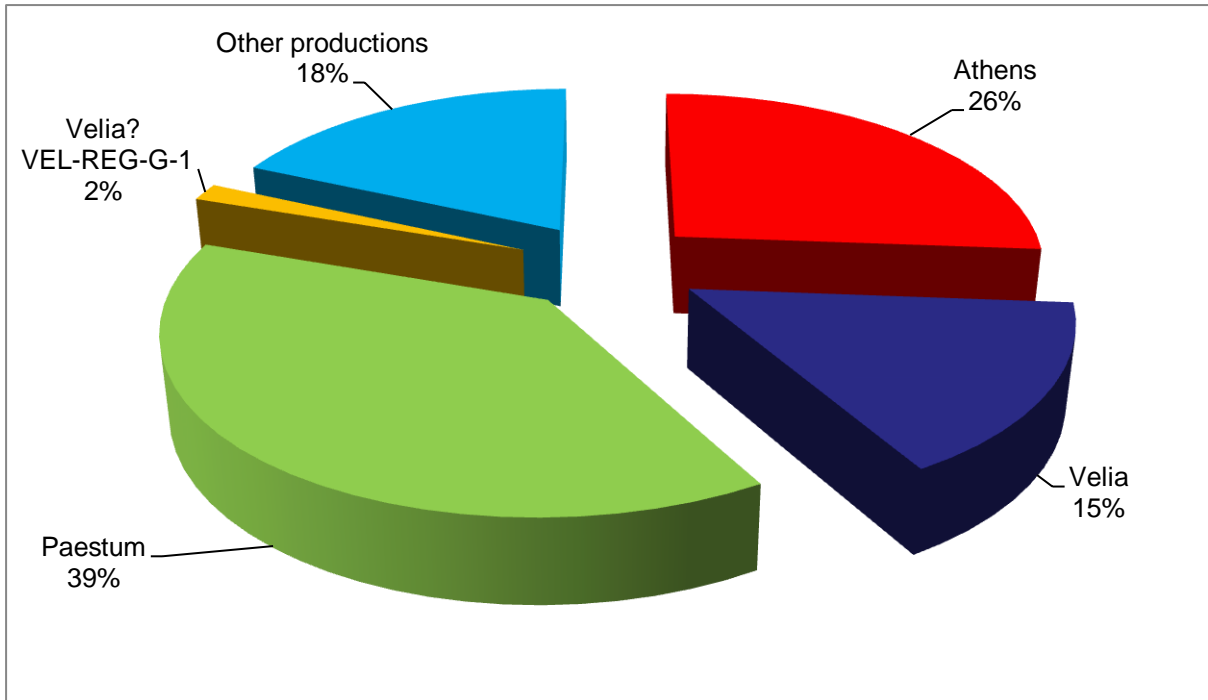


Fig.1. Velia. Phase B2. Black glazed ware: percentage of productions.

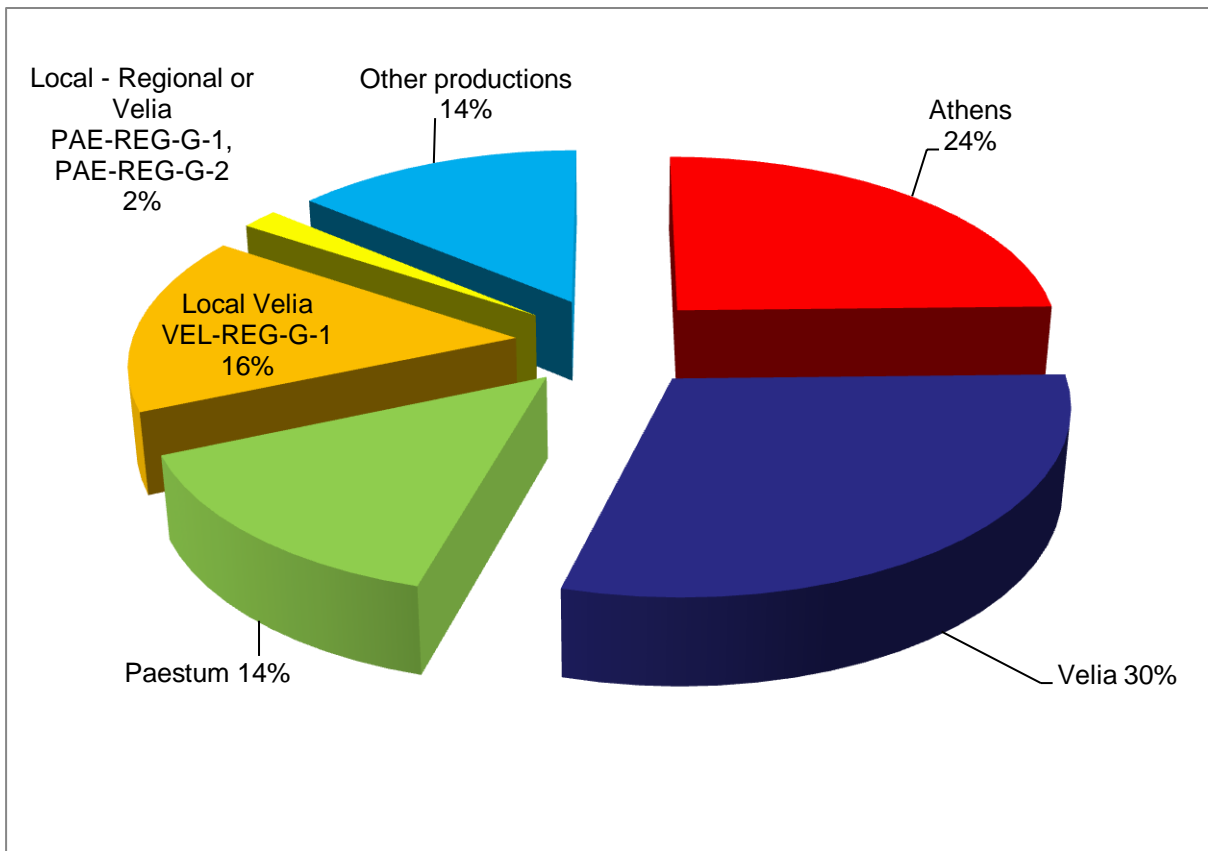


Fig.2. Velia. Phase B3. Black glazed ware: percentage of productions.

The local production of phase B2 consists to the greater part of simple forms, like small jugs, *skyphoi*, handleless bowls with plain rim and small bowls, forming a service of tableware. This service remains basically the same with slight alterations in types of rims and bases in phase B3. In phase B2 the most important drinking vessel produced by local workshops was the *skyphos* (pl.1-2). Its ring foot is mostly of the rounded, Attic type (pl.2; cat.13), while the flaring ring foot of the Corinthian type *skyphos* is attested only in a few cases (pl.2; cat.14).

The rims of rim types 1 and 2 (pl.1; cat.1-2) can be compared to *skyphoi* of the Attic type, which correspond to the series of Morel 4382, which is equally attested in Paestum.¹⁷ In phase B3 *skyphoi* of the local production mostly show a rim with a conical profile and straight wall (rim type 2, pl.1; cat.2) or a continuously curved profile (rim type 3, pl.1; cat.3). The shape can be compared to Series of Morel 4314. The bases may consist of a ring foot of the rounded, Attic type or a flaring ring foot,¹⁸ the zone above the flaring ring foot and the underside being reserved and carefully decorated with a concentric ring and a central dot. The shape is also attested in Paestum from the end of the 5th to the end of the 3rd c. B.C.E.¹⁹

Among the most common forms from the beginning of the local production are handleless bowls with continuously curved profile and plain rim (pl.3).²⁰ Rim fragments of this form frequently show on their outer surface a reserved line about two centimeters below the rim (pl.3; cat. 38, 40), sometimes this stripe is replaced only by incised lines.²¹ We can distinguish deep and shallow varieties with diameters from 14 to 18 cm. In phase B3 the reserved line on the outside is sometimes substituted by a line in painted white.

These rim fragments most probably can be combined with equally frequent fragments of high, conical ring feet with reserved underside and resting surface (pl.4; cat. 39) and thus lead to the reconstruction of handleless bowls which resemble contemporary bowls of the Attic type *deep wall and convex-concave profile*.²² In phase B2 the outer profile of these ring feet is usually concave, in phase B3 they generally became less conical and more cylindrical, their outer profile being slightly convex and their lower part often thickened (pl.4; cat. 41).

¹⁷ Attic type of Sparkes and Talcott 1970, no. 342. For analogies in Paestum, see De Caro and Di Gregorio 2010, 252-53; Ferrara 2009, 155.

¹⁸ The type corresponds to the skyphos of Corinthian type, see Sparkes and Talcott 1970, 81 fig.4.

¹⁹ For analogies with that type in Paestum, see De Caro and Di Gregorio 2010, 251-52 with the earlier bibliography.

²⁰ For analogies with that type at Velia see also Trapichler 2003, 213 fig. 6.

²¹ An example of the rim-shape and its characteristic decoration from Velia is published as „Kalottenschale“, Otto 1990, fig. 6.1.

²² Sparkes and Talcott 1970, 130 nos. 809-15 fig. 8, pl. 32.

While bowls of this type *deep wall and convex-concave profile* are not very popular in Athens itself, the shape is well attested in tomb contexts at Lipari, but neither the examples from Athens nor those from Lipari show the reserved, incised or painted in white line on the outer surface characteristic for the production of Velia.²³

In the Velinian contexts this shape is attested with fabrics of the local production as well as with fabrics, which were identified as regional or of Paestan provenance.²⁴ The early appearance of bowls of this type in Paestan fabrics was very surprising, as until now they are not attested in contexts of the mid 5th c. B.C.E. at Paestum itself, where similar bowls, called *paterae*, with strong resemblances to this type appear only in tomb contexts of the late 5th/early 4th c. B.C.E., always without the characteristic reserved line on the outside.²⁵

Another important shape of the local production is the small bowl, which shows a great variety in rim forms (pl.5). Most common in phase B2 are rim profiles (echinus rim, type 1 and 2, cat.52-54) similar to the Attic type *small bowl early and heavy*²⁶ which can be integrated into the series Morel 2737. Phase B3 sees the appearance of a new and more standardized variant of the small bowl which shows a thickened rim (rim type 1.3, 2.3; cat. 55, 56) and can be compared to Morel series 2714.²⁷

Less frequent are one-handled cups with banded decoration (fig.3, cat. 64-65), which evidently were produced during all of phase B,²⁸ though their greater part was imported from Poseidonia.

Also the slightly later cups of the type *one-handler* with flat rim sloping inward are attested only in limited numbers as far as the studied contexts of phases B2 and B3 are regarded. The

²³ For Athens see Sparkes and Talcott 1970, 130, fig. 8 nos. 809-815; for Lipari Bernabò Brea and Cavalier 1965, 212, fig.b 4, pl. LX 3b.

²⁴ See for example for the regional production the fabrics VEL-REG-G-1: cat. 21, PAE-REG-G-1: cat.40, for the Paestan production see, www.facem.at, fabrics PAE-G-2, sample M 2/11, which is taken from this shape.

²⁵ See www.facem.at:PAE-G-2, sample M 2/11 is taken from that form.

²⁶ Sparkes and Talcott 1970, 134 nos. 854-62, pl. 13; for examples from Velia see also Trapichler 2003, 214, fig.7 nos.1-2.

²⁷ For examples from Velia see also Trapichler 2003, 214, fig 7 nos.7-8.

²⁸ For the evidence from Poseidonia see De Caro and Di Gregorio 2010, 246-47, with bibliography.

only example of local production shows a convex concave profile and can thus directly be compared to the Attic prototype, which is attested more frequently (fig.4; cat. 66).²⁹

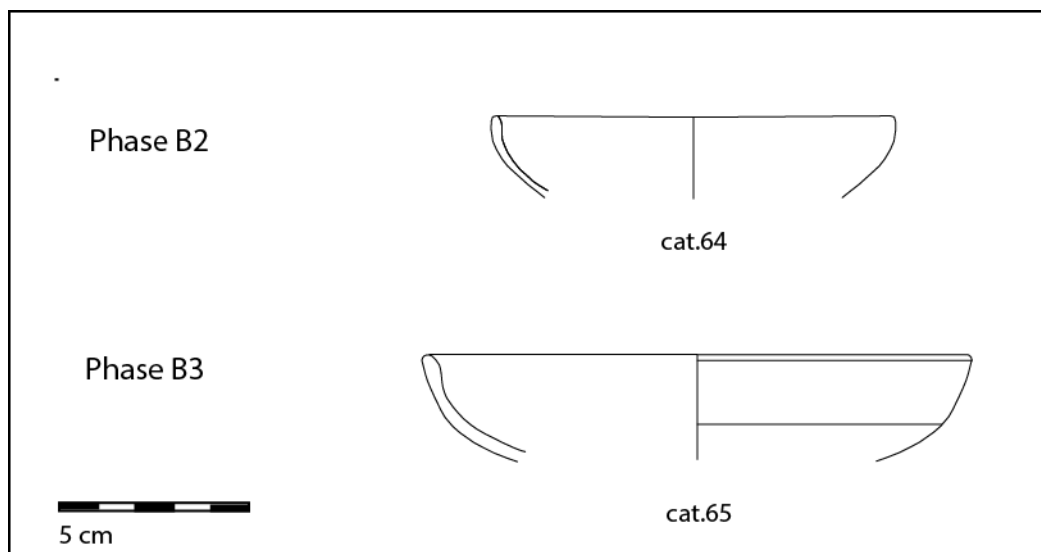


Fig.3. Velia. Black glazed ware. One handled cups.

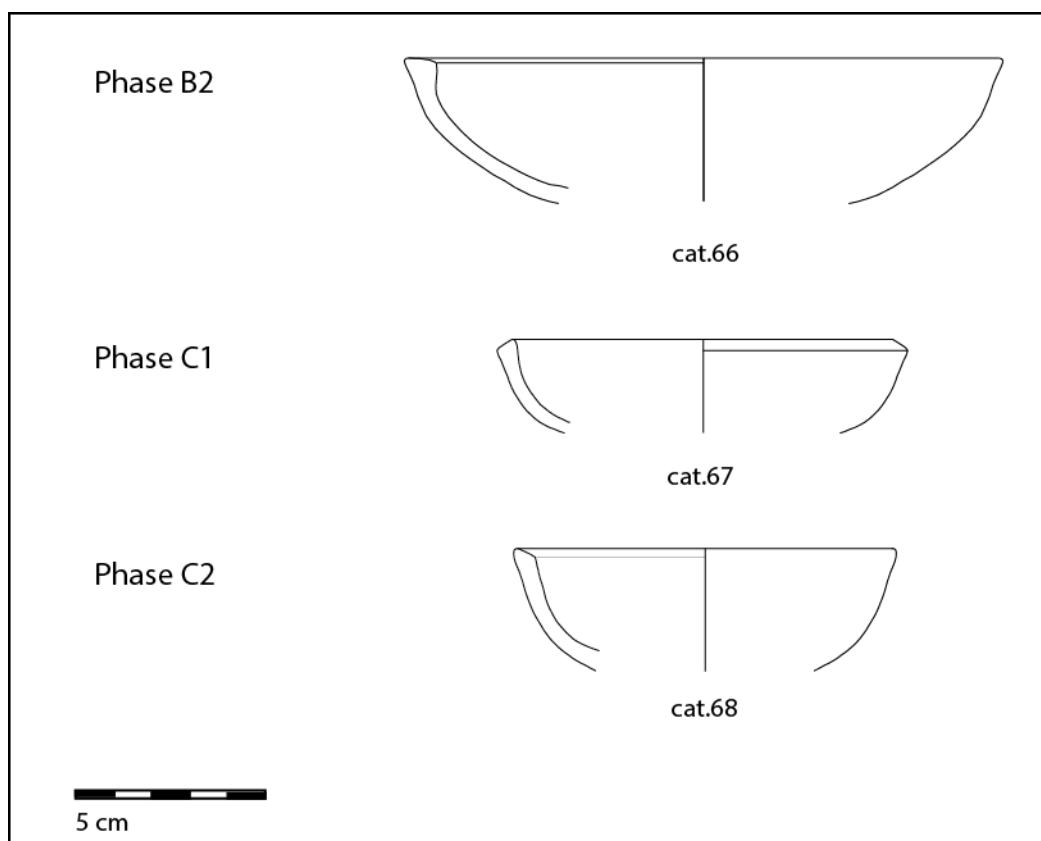


Fig.4. Velia. Black glazed ware. One-handler with flat rim.

²⁹ Sparkes and Talcott 1970, 289 nos. 749-54 fig. 8 pl. 31; For examples from Velia see also Trapichler 2003, 209, fig. 2 nos. 5.6.

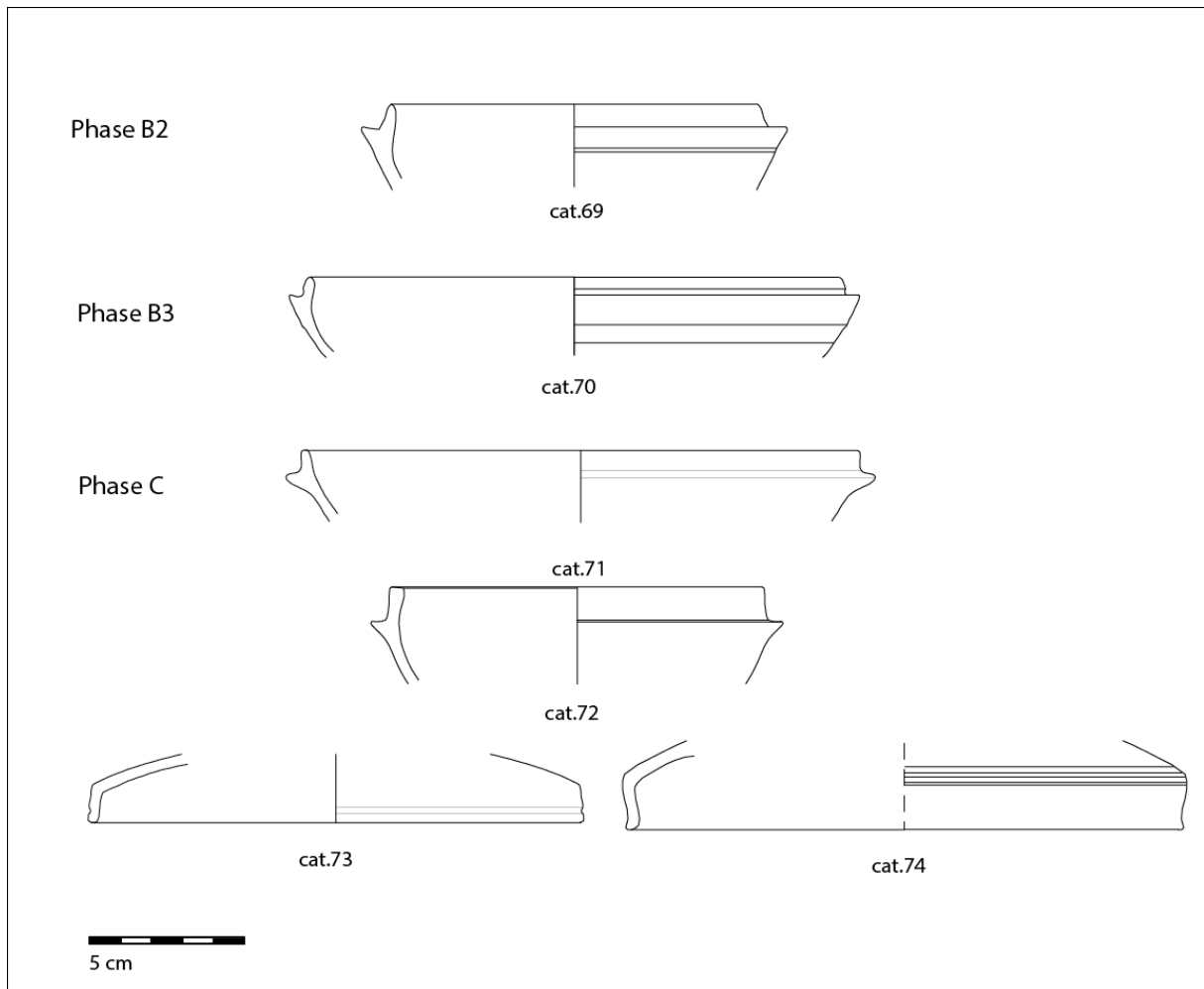


Fig.5. Velia. Black glazed ware. Lekani des and lids.

The range of shapes of the local production is completed by vessels provided with a lid-rest, like *pyxides* and *lekanides* (fig.5), the later are more frequent in phase B3, when they follow vaguely the Attic type *lidded with ribbon handles* (cat.69-70).³⁰

It has to be stressed that up to now no other types of cups like the popular stemless cup with inset or plain rim are attested among the Velinian production. At least in phase B2 these more elaborated drinking vessels have all been imported from Athens or Paestum. Only in phase B3 the local potters began to produce also more refined forms which evidently were not destined for daily use, but rather for special occasions, like symposia. Two examples are the rim fragment of a *stemless delicate class* (Morel 4221, cat. 36, fig.6)³¹ and a

³⁰Sparkes and Talcott 1970, 165 nos.1212-220, fig. 11, pl. 40.

³¹ For the Attic type *stemless delicate class* see Sparkes and Talcott 1970, nos.483-517, fig.5 pl.23.

plate *type Gallatin* with curved lip, the later decorated with a reserved zone below the rim showing a painted decoration with dots (cat.37, fig.6).³²

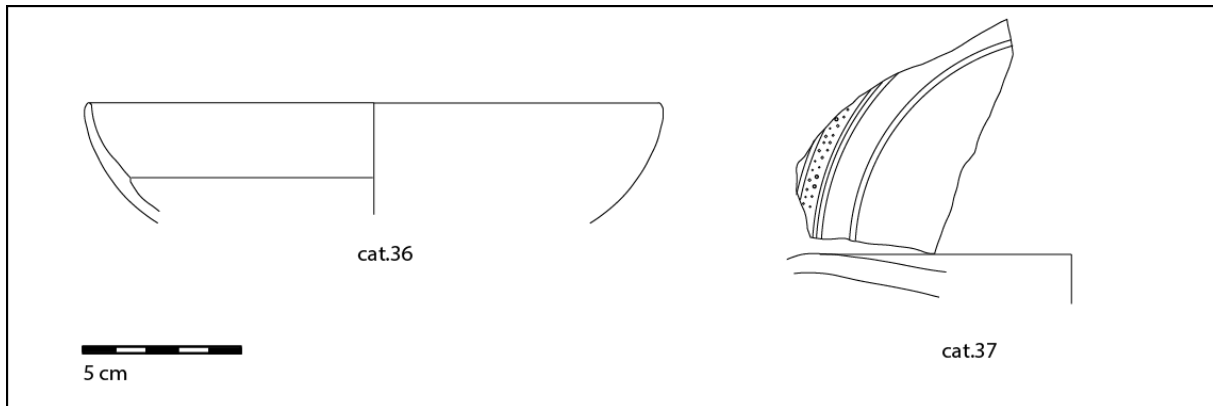


Fig.6. Velia. Black glazed ware. Stemless delicate class (Morel 4221) and plate *type Gallatin*.

From the late 5th c. B.C.E. onwards (pottery phase B3) we identified vessels corresponding to the morphological repertoire of the Velinian production, but displaying the fabrics VEL-REG-G-1, PAE-REG-G-1 and PAE-REG-G-2 of the so-called regional production, so that we can assume that this productions started in this period.³³ The use of these fabrics can be followed until the end of the traditional shapes of tableware about the middle of the 3rd c. B.C.E. (phase D2). In phase B3 vessels of the fabric VEL-REG-G-1 often present shapes like *skyphoi* with flaring ring feet and incurved rim (rim type 4, cat. 4; pl.1) or *skyphoi* with conical profile (rim type 3, cat.3; pl.1), the characteristic handleless bowls with plain rim, sometimes decorated by a horizontal line on its outer surface (cat. 40), and small bowls (rim type 2.3, cat. 55, 56).

Most important, however, is the reappearance of the cup *skyphos* in phase B3, gaining its greatest importance in phase C, when it assumes the function of the stemless cups of the 5th c. B.C.E. (pl.6). In phase B 3, the last quarter of the 5th and beginning the 4th c. B.C.E., the shapes of cup *skyphoi* are inspired by the Attic prototypes of the cup *skyphos* heavy wall (cat. 20).³⁴

³² Sparkes and Talcott 1970, 142, pl. 25; Trendall and McPhee 1987, 23; for the decoration of this form see Trendall and McPhee 1987, 24, pl.1 c-f; for examples from Velia see Maffettone 1999, 11, pl.4 nos.18-21.

³³ For a discussion of this production see "The fabrics of Black Glaze Ware of Velia" in this contribution.

³⁴ Sparkes and Talcott 1970, no. 621.

Pottery Phase C (400 – 300 B.C.E.)

In phase C the most frequent shapes in Velia are products of workshops which can be localized at Velia as well as at Paestum and their surroundings. At the present state of research we were not able to see eventual differences in the morphological language of these workshops.

The leading form of phase C1, dated to the first decades of the 4th c. B.C.E., is represented by the cup *skyphos with inset lip* (cat. 21, pl.6). The evolution of this form starts in phase B3,³⁵ inspired by Attic prototypes like the cup *skyphoi heavy wall*³⁶. The examples of this group show the slightly calcareous fabrics PAE-REG-G-1 and PAE-REG-G-2. The form is – up to now – not known from contexts of Paestum. Also the cup *skyphos light wall with rim set off inside* (pl.6) starts in phase C1, when it is mainly attested with Attic fabrics. It is a characteristic form in tombs of the necropolis of Lipari of the second third of the 4th c. B.C.E.³⁷ In Paestum the only published example appears in a tomb dated to about 380 B.C.E.³⁸ In Phase C2 the form is comparatively shallow and thin walled (cat. 22). It shows a molded ring foot with comparatively large diameter (cat. 23-24; pl.7). On the inside of the bottom it is often decorated with stamped and incised decoration consisting in central rosettes, linked palmettes and ovules (cat. 24). In phase C3 the features of the cup *skyphos* change considerably, developing towards a deeper, beaker-like form (rim type 2 and 3, cat. 25-26). The molded ring foot shows a reduced diameter and gains in height (cat. 27). Impressed decoration is rare, and, when present, consists of central rosettes. The development of the shape in the last third of the 4th c. B.C.E. cannot be followed anymore at Lipari, but its dating to the last third of the 4th c. B.C.E. is confirmed by an example from Roccagloriosa.³⁹

Little is to be said about the appearance of the two handled cup type *bolsal* (fig. 7), which is very popular in other Western Greek contexts of the 4th c. B.C.E. and attested at Velia as

³⁵ See supra and also Trapichler 2003, 212, fig.5.

³⁶ The best examples do not stem from the Athenian Agora, but are represented by Attic examples from the Porticello ship wreck (see Eiseman and Ridgway 1987, 26) and from Corinth, see Pemberton 1997, 77, fig.15.

³⁷ Bernabò Brea and Cavalier 1965, 224-26; Bernabò Brea and Cavalier 1991, 87- 9, pl. 47, pl.74, fig. 193, pl. 85 figs. 223-25, 155, figs. 451. 453.

³⁸ Pontrandolfo and Rouveret 1992, fig. 314.6.

³⁹ Gualtieri and Fracchia 1990, 235, fig. 179 no. 76.

Attic import in phase B3.⁴⁰ In phase C1 the shape is produced locally, as attested by some fragments of bases and rims with handles (cat. 34 – 35). Anyway, in the settlement contexts of Velia a similar importance of the form like in the contexts of the necropolis in Lipari can be excluded.

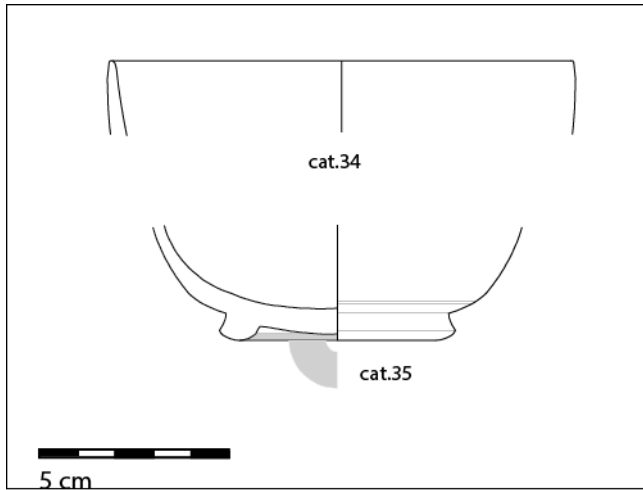


Fig.7. Velia. Black glazed ware. Two-handled cup of type bolsal.

The *skyphos* remains an important shape in numbers (about 25%) – but due to the lack of entire profiles its development in phase C remains hard to follow (pl.1.2). The different varieties of bases and rims can be reconstructed to vessels of the Corinthian as well as of the Attic type like in the preceding phase. During the entire phase C the *skyphos* of Corinthian Type (Morel 4311) is thin walled, in phase C1 and C2 it maintains a conical and comparatively wide mouthed shape (cat.4 – 5) or shows a profile being often slightly incurved below the rim. In comparison to phase B, the diameter of the flaring ring feet is reduced. Incurving rims are attested sporadically from phase C2 onwards and appear more often in phase C3 (rim type 4, cat. 7 – 8). Rims with S-shaped profiles, which are attested especially in phase C2 (rim type 5, cat. 9), may be considered as characteristic feature of the *skyphos* of the Attic type (Morel 4382, 4373) of the local production. The ring feet of *skyphoi* of the Attic type do not change much during the phases C1 and C2 in respect to the earlier examples of phase B3, the wall above the comparatively large ring foot being straight or slightly drawn in (cat. 15; pl.2). In phase C3 the diameter of the ring foot is reduced (cat. 16 – 17). In general the

⁴⁰For examples from Paestum see Pontrandolfo and Rouveret 1992, 419, fig.78b; De Caro and Di Gregorio 2010, 250. For Lipari see Bernabò Brea and Cavalier 1965, 212, pl. C2; Bernabò Brea and Cavalier 1991, 84; 158, fig.451ab. For Locri see Barra Bagnasco 1989, 114, no.72 pl.21.

development of local *skyphoi* both of the Attic and the Corinthian type may be regarded as similar to that attested in Paestum.⁴¹

Like in the preceding phase B handleless bowls with plain rim play an important part in the form repertoire of the Black Glaze Ware (pl.3.4). In phase C1 this shape can occasionally be decorated with a white painted band (cat. 42), later the vessels remain undecorated (cat.44 – 45). In phase C1 and especially in C2 the high ring foot, which began in phase B2, obtains its standardized, conical shape with convex or slightly concave curved profile and a clearly thickened resting surface (cat. 46 – 47).⁴² A misfired example of the form (cat. 43) which stems from a debris layer from the eastern quarter of the city (Vignale) gives an important hint for the existence of a local production, but it has to be stated that most of the attested examples of phase C belong to local-regional and Paestan workshops, in particular to the fabrics PAE-REG-1 and PAE-REG-2.⁴³ The bowls show morphological similarities to the so called *paterae* from Paestum, Lipari and Locri, which in general are more shallow and present an impressed decoration which does not appear in the Velinian examples.⁴⁴ During Phase C3 in the last third of the 4th c. B.C.E. a further development of the shape can be observed: The walls become thicker, the inside of the profile can be offset by a sharp edge (cat.48). The ring feet show a reduced diameter, while the thickened lower part of the ringfoot is heightened (cat.49).

In the phases C1 and C2 small bowls obtain their standardized form with a clearly thickened rim which is offset from the inner surface by a sharp edge (rim type 1.3.; cat.57 – 58, pl.5). In phase C3 the form increases in height, the rim tends to curve in (cat.59). At the same time a new form, the so-called saltcellar with echinus rim, occurs and shows the same development in height (cat.60).

In phase C the bowls of the type one-handler with beveled rim seem to be more common than in the preceding phase and display different rim types (fig.4). From phase C2 onwards

⁴¹ See Pontrandolfo 2000, 126-29, tab. 1-2.

⁴² See Trapichler 2003, 213, fig.6.

⁴³ In the 4th century especially the fine fabric PAE-G-4 is also common with these shapes, for its description see Gassner and Trapichler 2011.

⁴⁴ For the *paterae* in Paestum see Pontrandolfo and Rouveret 1992, 423; in Lipari see Bernabò Brea and Cavalier 1965, 80, Bernabò Brea and Cavalier 1991, 84; in Lokroi see Barra Bagnasco 1989, 148-49.

the profile of the wall becomes steeper in the upper part, the wall itself thicker (cat. 67-68). The shape finds close analogies with forms attested at Paestum from the late 5th to the 4th c. B.C.E. (Morel 6221).⁴⁵

Among the covered vessels at the beginning of phase C the *lekanides* maintain the shapes of the preceding phase B (cat.71, fig.5). In phase C a new type occurs with a marked external flange on the outside and a slightly incurving rim (rim type 2.2, cat.72). The characteristic lids of phase C show an angular profile (cat.73 – 74). They find analogies in contexts of Paestum, Lipari, Roccagloriosa and Locri throughout the entire 4th c. B.C.E.⁴⁶

In phase C 3 we see also the appearance of few plates with plain rim and small diameter (cat.75 – 76, fig.8). At Velia the shape gains greater importance in the following phase D, but is already well represented in the tomb contexts of Paestum in the 4th c. B.C.E.⁴⁷

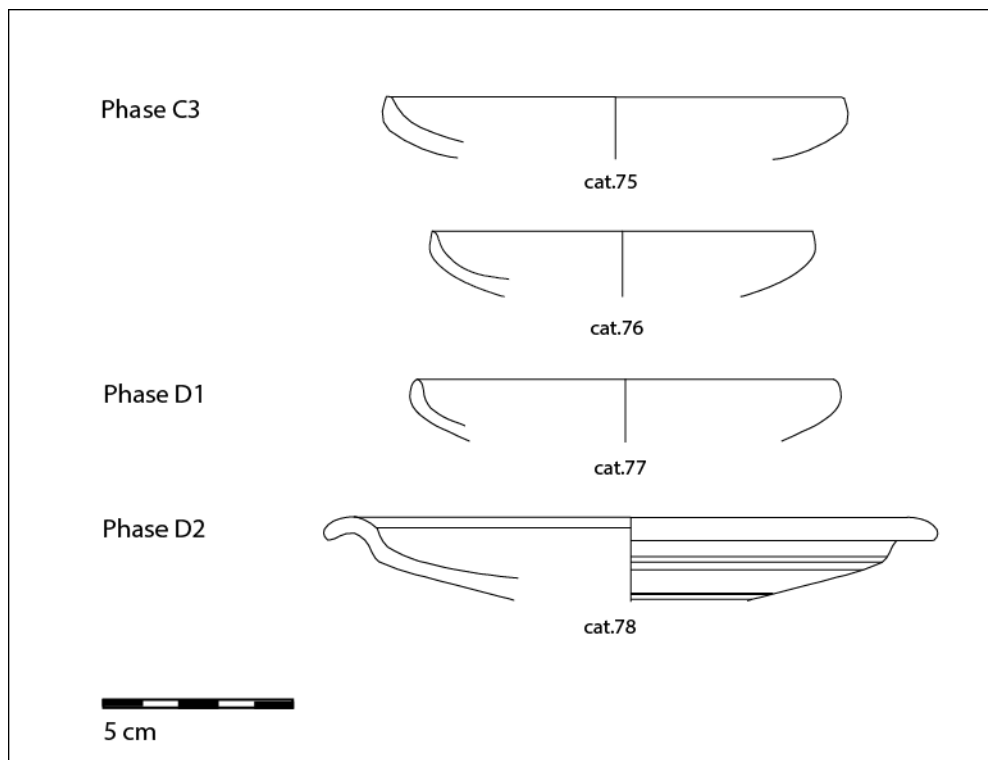


Fig.8. Velia. Black glazed ware. Plates.

⁴⁵ Pontrandolfo and Rouveret 1992, 421, fig.79; De Caro and Di Gregorio 2010, 254-55.

⁴⁶ Lokroi: Barra Bagnasco 1989, no. 143 pl. 25. Roccagloriosa: Gualtieri and Fracchia 1990, 250, fig. 181 no. 152; Lipari: Bernabò Brea and Cavalier 1965, pl. 75 no.4a. Paestum: Pontrandolfo and Rouveret 1992, 346.no.10.

⁴⁷ Pontrandolfo and Rouveret 1992, fig. 311.5; 357.11.

Pottery phase D (300 – 250/40 ca.)

Also in phase D the production of the traditional forms is not limited to the local workshops (VEL-G-1 to VEL-G-4), but they appear also often in the production of regional workshops (PAE-REG-G-1 and 2) and at Paestum itself (PAE-G-4). The leading form is represented by the cup *skyphos*, which shows a further development in proportions and rim types (rim type 4 and 5, pl.5). The profile of the shape increases in height, the profile of the wall being steep (rim type 4, cat.28; cat.31) or slightly turned out (rim type 5, cat. 29; cat. 32). Also the ring feet increase in height, while their diameter is further reduced (cat.30; pl.7). In this last stage of its development the curved handles are elevated high above the rim (cat. 33).

Skyphoi are mostly represented by examples of regional or Paestan fabrics and show the same development of their proportions like the cup *skyphoi*: Both types increase in height and show reduced diameters of rims and ring feet (pl.1.2). Most of the few examples of this last phase come from Paestum and only a few, mostly of the late form of the *skyphos* of Corinthian type, belong to the local-regional group (PAE-REG-G-1, cat.11 – 12; cat. 18 – 19). A local example of the same shape shows a conical profile (rim type 3) with reduced diameter (cat.10).

Proportions develop in the same way for the bowls with plain rim of phase D (cat.50, pl.3). The last stage of this evolution is represented by an example of a high ring foot from a context of phase D1 (cat.51, pl.3) showing a slim form with reduced diameter and a clearly thickened lower part.

In phase D small bowls and saltcellars are present only in reduced numbers, compared to the preceding phases (pl.5); they are exclusively products of local or local-regional workshops. They show a further development of the development that began in phase C3 with an increase in height and the reducing of the diameters of rims and bases (cat.61 – 62).

Only few of the newly invented, non-traditional shapes of phase D were imitated by local or regional workshops. Among these we find in particular plates with plain rims, which emerged first in phase C3 (cat.77, fig.8). In phase D2 local examples of deep bowls (species Morel 2670) and plates with projecting rim (species Morel 1310) are attested, the latter in fabric PAE-REG-G-1 (cat.78, fig.8). As far as the technique of the black gloss and the surface

treatment is concerned, the gloss continues to be applied by brush (and not by immersion), but often is less carefully applied, leaving the underside of the vessels plain.

Discussion

The local production of Black Glaze ware at Velia started in the first half of the 5th c. B.C.E., as some analyzed samples proof, but it is only in phase B2 in the second half of the 5th c. B.C.E. that examples are attested in notable quantities. The shapes produced in this phase are simple, consisting to the greater part of *skyphoi*, handleless bowls with plain rim and small bowls. They therefore represent a reduced repertoire in comparison with the products imported from the neighboring city of Poseidonia. Only in phase B3 in the last quarter of the 5th and the beginning of the 4th c. B.C.E., these shapes show distinct features and the range of forms widens. In phase C the imitation and a new interpretation of certain Attic forms began and the Velinian potters developed a specific set of vessels, which consisted of cup-*skyphos*, *skyphos*, handleless bowl and small bowl and becomes characteristic for the production of Velia. The analyses of the fabrics of these vessels made clear that they belong only to a limited degree the local production of Velia (VEL-G-1 to VEL-G-4), but also to the so-called regional production with the fabrics VEL-REG-G-1, PAE-REG-G-1 and PAE-REG-G-2. For the solution of the problem of the exact localization of these productions further research on raw-materials in the surroundings of Velia and Paestum will be necessary.

(M. Trapichler)

Catalogue

Cat. 1. (pl.1). Skyphos. Rim type 1. Shiny black glaze. VEL-G-1. Lower Town, Crossroad, 45/89-4. Pottery phase B 2 (450–425 B.C.E.).

Cat. 2. (pl.1). Skyphos. Rim type 2. Shiny reddish brown glaze. VEL-G-1. Lower Town, Crossroad, 57/90-6. Pottery phase B 2 (450–425 B.C.E.).

Cat. 3. (pl.1). Skyphos. Rim type 3. Shiny yellowish red to dark grey glaze. VEL-G-3. Lower Town, Crossroad, 18/90-33. Pottery phase B 3 (425-400 B.C.E.).

- Cat. 4. (pl.1). Skyphos. Rim type 4.1. Shiny black glaze. VEL-REG-G-1. Lower Town, Crossroad, 18/90-13. Pottery phase B 3 (425-400 B.C.E.).
- Cat. 5. (pl.1). Skyphos. Rim type 2.1. Shiny dark brown glaze. VEL-G-3. Eastern quarter, Crossroad D3, 10.014/97-2. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 6. (pl.1). Skyphos. Rim type 2.1. Shiny black glaze. VEL-G-2. Lower Town, 251, Fortification, wall B, 216/99-6. Pottery phase C 3 (330-300 B.C.E.).
- Cat. 7. (pl.1). Skyphos. Rim type 4.2. Shiny dark grey glaze. VEL-G-2. Eastern quarter, Crossroad D3, 10.011/97-2. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 8. (pl.1). Skyphos. Rim type 4.1. Shiny black glaze. VEL-G-1. Lower Town, Fortification, wall B, 216/99-7. Pottery phase C 3 (330-300 B.C.E.).
- Cat. 9. (pl.1). Skyphos. Rim type 5.3. Metallic dark grey glaze. VEL-G-1. Eastern quarter, Crossroad D3, 10.020/97-9, 10. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 10. (pl.1). Skyphos. Rim type 3. Shiny black glaze. VEL-G-2. Acropolis, Pozzo I, fill, PI/77-19. Pottery phase D 2 (275-250 B.C.E.).
- Cat. 11. (pl.1). Skyphos. Rim type 4. Metallic grey glaze. VEL-C-4. Lower Town, Fortification, wall B, 205/97-2. Pottery phase D 1 (300-275 B.C.E.).
- Cat. 12. (pl.1). Skyphos. Rim type 4.1. dull, grey glaze. PAE-REG-G-1. Lower Town, Fortification, wall B, 209/99-25. Pottery phase D 2 (275-250 B.C.E.).
- Cat. 13. (pl.2). Skyphos. Ring foot. Shiny reddish brown glaze, underside reserved with painted circles and dot at center. VEL-G-2. Lower Town, Crossroad, 57/90-6a. Pottery phase B 2 (450-425 B.C.E.).
- Cat. 14. (pl.2). Skyphos. Ring flaring foot. Shiny black glaze, underside and junction of foot and body reserved. VEL-G-3. Lower Town; Crossroad, 87/89-15. Pottery phase B 3 (425-400 B.C.E.).
- Cat. 15. (pl.2). Skyphos. Ring foot. Shiny black, glaze, underside reserved with painted circles and dot at center. VEL-G-1. Eastern quarter, Crossroad D3, 10.019/97-26. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 16. (pl.2). Skyphos. Ring foot 8. dull dark grey glaze. VEL-G-3. Eastern quarter, Crossroad D3, 10062/97-53. Pottery phase C 3 (330-300 B.C.E.).

- Cat. 17. (pl.2). Skyphos. Flaring ring foot. Shiny black glaze. Underside and junction of foot and body reserved. VEL-G-3. Eastern quarter, Crossroad D3, 10.015A/97-21. Pottery phase C 3 (330-300 B.C.E.).
- Cat. 18. (pl.2). Skyphos. Flaring ring foot. Shiny black glaze, underside reserved. PAE-REG-G-1. Lower Town, Fortification, wall B, 209/99-470. Pottery phase D 2 (275-250 B.C.E.).
- Cat. 19. (pl.2). Skyphos. Flaring ring foot. Shiny black to red glaze, underside and junction of foot and body reserved. PAE-REG-G-1. Acropolis, Pozzo I, fill, PI/77-15. Pottery phase D 2 (275-250 B.C.E.).
- Cat. 20. (pl.6). Cup skyphos, inset lip 2.2. Metallic, dark grey glaze. VEL-REG-G 1. Lower Town, Crossroad, 108/89-12. Pottery phase B 3(425-400 B.C.E.).
- Cat. 21. (pl.6). Cup skyphos, inset lip 2.2. Shiny black glaze. PAE-REG-G-1. Eastern quarter, Crossroad D3, 10.058/97-66. Pottery phase C 1 (400-370/60 B.C.E.).
- Cat. 22. (pl.6). Cup skyphos, rim offset inside 1. Lustrous black glaze. PAE-REG-G-1. 252. Eastern quarter, Crossroad D3, 10.009/97-2. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 23. (pl.7). Cup skyphos. Molded ring foot 3.1. Shiny black glaze, underside and stem reserved. PAE-REG-G-1. Eastern quarter, Crossroad D3, 10.009/97-22. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 24. (pl.7). Cup skyphos. Molded ring foot 3.2. Shiny black glaze, worn. Inside palmettes. PAE-REG-G-1. Eastern quarter, Crossroad D3, 10.011/97-17. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 25. (pl.6). Cup skyphos, rim offset inside 2. Shiny black glaze. VEL-G-2. Lower Town, Fortification, wall B, 216/99-9. Pottery phase C 3 (330-300 B.C.E.).
- Cat. 26. (pl.6). Cup skyphos, rim offset inside 3. Lustrous black glaze. PAE-REG-G-2. Eastern quarter, Crossroad D3, 10.025/97-8. Pottery phase C 3 (330-300 B.C.E.).
- Cat. 27. (pl.6). Cup skyphos. High molded ring foot 1. Shiny black glaze. Underside and stem reserved. PAE-REG-G-1. Eastern quarter, Crossroad D3, 10.015A/97-30. Pottery phase C 3 (330-300 B.C.E.).
- Cat. 28. (pl.6). Cup skyphos, rim offset inside 4. Shiny black glaze. PAE-REG-G-1. Lower Town, Crossroad, 205/97-4. Pottery phase D 1 (300-275 B.C.E.).
- Cat. 29. (pl.6). Cup skyphos, rim offset inside 5. Shiny black glaze. PAE-REG-G-1. Lower Town, Fortification, wall B, 206/97-352. Pottery phase D 1 (300-275 B.C.E.).

- Cat. 30. (pl.7). Cup skyphos. High molded ring foot 2. Shiny dark grey glaze. Underside and stem reserved. PAE-REG-G-1. Lower Town, Fortification, wall B, 211/99-10. Pottery phase D 1 (300-275 B.C.E.).
- Cat. 31. (pl.6). Cup skyphos, rim offset inside 4. Shiny brownish red glaze. VEL-G-1. Lower Town, Fortification, wall B, 209/99-29. Pottery phase D 2 (275-250 B.C.E.).
- Cat. 32. (pl.6). Cup skyphos, rim offset inside 5. dull black glaze. VEL-G-4. Lower Town, Fortification, wall B, 209/99-443. Pottery phase D 2 (275-250 B.C.E.).
- Cat. 33. (pl.6). Cup skyphos, rim offset inside 5. Shiny black glaze. PAE-REG-G-1. Acropolis, Pozzo I, fill, PI/77-22. Pottery phase D 2 (275-250 B.C.E.).
- Cat. 34. (fig.7). Cup type Bolsal. Plain rim. Shiny black glaze. VEL-G-3. Eastern quarter, Crossroad D3, 10.027/97-1. Pottery phase C 1 (400-370/60 B.C.E.).
- Cat. 35. (fig.7). Cup type Bolsal. Flaring ring foot. Lustrous dark grey glaze. Underside reserved, painted circle. PAE-REG-G-1. Eastern quarter, Crossroad D3, 10.059/97-40. Pottery phase C 1 (400-370/60 B.C.E.).
- Cat. 36. (fig.6). Stemless "delicate class". Lustrous black glaze, outside reddish brown, mottled. VEL-G-1. Lower Town, Crossroad, 18/90-17. Pottery phase B 3 (425-400 B.C.E.).
- Cat. 37. (fig. 6). Plate, type "Gallatin". Shiny black glaze, reserved stripes. Painted black dots and lines. VEL-G-3. Lower Town, Crossroad, 23A/90-10. Pottery phase B 3 (425-400 B.C.E.).
- Cat. 38. (pl.3). Bowl. Plain rim 1.2. Shiny black glaze, outside: stripe reserved. VEL-G-1. Lower Town, 253, Crossroad, 28/90-1. Pottery phase B 2 (450-425 B.C.E.).
- Cat. 39. (pl.4). Bowl. High ring foot 1.2. Shiny black glaze. VEL-G-1. Lower Town, Crossroad, 44/90-6. Pottery phase B 2 (450-425 B.C.E.).
- Cat. 40. (pl.3). Bowl. Plain rim 2.2. Shiny black glaze, outside stripe reserved. VEL-REG-G-1. Lower Town, Crossroad, 18/90-9. Pottery phase B 3 (425-400 B.C.E.).
- Cat. 41. (pl.4). Bowl. High ring foot 2.1. Lustrous reddish yellow glaze. VEL-G-1. Lower Town, Crossroad, 25/90-9. Pottery phase B 3 (425-400 B.C.E.).
- Cat. 42. (pl.3). Bowl. Plain rim 2.1. Shiny black glaze, outside white painted stripe. PAEREG-G-1. Eastern quarter, Crossroad D3, 10.059/97-25. Pottery phase C 1 (400-370/60 B.C.E.).

- Cat. 43. (pl.4). Bowl. High ring foot 1.1. Reddish brown to dark brown glaze, misfired. Eastern quarter, Crossroad D3, 10.022/97-5. Pottery phase C 1 (400-370/60 B.C.E.).
- Cat. 44. (pl.3). Bowl. Plain rim 1.1. Shiny black glaze. VEL-G-4. Eastern quarter, Crossroad D3, 10.014/97-4. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 45. (pl.3). Bowl. Plain rim 2.2. Shiny black glaze. VEL-G-1. Eastern quarter, Crossroad D3, 10.020/97-21. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 46. (pl.4). Bowl. High ring foot. Shiny dark grey glaze; underside reserved. VEL-G-3. Eastern quarter, Crossroad D3, 10.014/97-8. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 47. (pl.4). Bowl. High ring foot 2.3. Black shining glaze. PAE-REG-G-1. Eastern quarter, Crossroad D3, 10.019/97-25. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 48. (pl.3). Bowl. Plain rim 2.2. Brownish dark grey glaze. VEL-G-4. Eastern quarter, Crossroad D3, 10.025/97-15. Pottery phase C 3 (330-300 B.C.E.).
- Cat. 49. (pl.4). Bowl. High ring foot 3. Shiny black glaze. Underside: graffito: E. PAE-REGG-2. Eastern quarter, Crossroad D3, 10.015A/97-24. Pottery phase C 3 (330-300 B.C.E.).
- Cat. 50. (pl.3). Bowl. Plain rim 2.1. Shiny black glaze. VEL-G-2. Lower Town, Fortification, wall B, 206/97-156. Pottery phase D 1 (300-275 B.C.E.).
- Cat. 51. (pl.4). Bowl. High, narrow ring foot, 1.2. Shiny black glaze, worn. VEL-G-3. Lower Town, Fortification, wall B, 211/99-13. Pottery phase D 1 (300-275 B.C.E.).
- Cat. 52. (pl.5). Small Bowl, echinus rim 1.2. Outside shiny reddish yellow glaze, inside dark grey. VEL-G-2. Lower Town, Crossroad, 46/89-15. Pottery phase B 2 (450–425 B.C.E.).
- Cat. 53. (pl.5). Small Bowl, echinus rim 2. Shiny black glaze. VEL-G-3. Lower Town, Crossroad, 27/90-3a. Pottery phase B 2 (450–425 B.C.E.).
- Cat. 54. (pl.5). Small Bowl, echinus rim. Grey glaze, worn. VEL-G-3. Lower Town, Crossroad, 18/90-4a. Pottery phase B 3 (425-400 B.C.E.).
- Cat. 55. (pl.5). Small bowl, thickened rim 1.3. Shiny black glaze, worn. VEL-G-3. Lower Town, 254, Crossroad, 25/90-8. Pottery phase B 3 (425-400 B.C.E.).
- Cat. 56. (pl.5). Small bowl, thickened rim. Rim type 2.3. Shiny dark grey glaze. VEL-REGG-1. Lower Town, Crossroad, 103/89-83. Pottery phase B 3 (425-400 B.C.E.).

- Cat. 57. (pl.5). Small bowl, thickened rim 1.3. Shiny black glaze. VEL-G-4. Eastern quarter, Crossroad D3, 10.027/97-5. Pottery phase C 1 (400-370/60 B.C.E.).
- Cat. 58. (pl.5). Small bowl, thickened rim 1.3. Outside shiny black glaze, inside reddish brown. VEL-G-3. Eastern quarter, Crossroad D3, 10.020/97-34. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 59. (pl.5). Small bowl, thickened rim. Shiny dark grey glaze. VEL-G-2. Lower Town, Fortification, wall B, 216/99-20. Pottery phase C 3 (330-300 B.C.E.).
- Cat. 60. (pl.5). Small Bowl, echinus rim 4. Shiny black glaze. PAE-REG-G-1. Eastern quarter, Crossroad D3, 10.062/97-62. Pottery phase C 3 (330-300 B.C.E.).
- Cat. 61. (pl.5). Small Bowl, echinus rim 4. Shiny black glaze. VEL-G-3. Lower Town, Fortification, wall B, 205/97-17. Pottery phase D 1 (300-275 B.C.E.).
- Cat. 62. (pl.5). Small bowl, thickened rim 1.3.2. Yellowish red glaze, worn. PAE-REG-G-1. Lower Town, Fortification, wall B, 209/99-66. Pottery phase D 2 (275-250 B.C.E.).
- Cat. 63. (pl.5). Small Bowl, echinus rim 4. Shiny black glaze. PAE-REG-G-2. Lower Town, Fortification, wall B, 209/99-64. Pottery phase D 2 (275-250 B.C.E.).
- Cat. 64. (pl.3). Bowl, plain rim 1.1. dull yellowish red glaze. VEL-G-1. Lower Town, Crossroad, 54/89-1. Pottery phase B 2 (450–425 B.C.E.).
- Cat. 65. (pl.3). Bowl, plain rim 2.1. dull dark grey glaze, outside: stripe below rim reserved. VEL-REG-G-1. Lower Town, Crossroad, 25/90-18. Pottery phase B 3 (425-400 B.C.E.).
- Cat. 66. (fig.4). Onehandler 3. Shiny, brownish black glaze. VEL-G-1. Lower Town, Crossroad, 41/89-3. Pottery phase B 2 (450–425 B.C.E.).
- Cat. 67. (fig.4). Onehandler 3. dull black glaze, worn. PAE-REG-G-1. Eastern quarter, Crossroad D3, 10.061/97-12. Pottery phase C 1 (400-370/60 B.C.E.).
- Cat. 68. (fig.4). Onehandler 4. Shiny black glaze. VEL-G-4. Eastern quarter, Crossroad D3, 10.019/97-20. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 69. (fig.5). Lekanis 2. Inside dull black glaze. VEL-G-1. Lower Town, Crossroad, 109/89-32. Pottery phase B 2 (450–425 B.C.E.).
- Cat. 70. (fig.5). Lekanis 3. Shiny dark grey glaze. Outside reserved stripe. VEL-G-3. Lower Town, Crossroad, 279/89-36. Pottery phase B 3 (425-400 B.C.E.).

- Cat. 71. (fig.5). Lekanis 2.1. Red glaze, outside worn. VEL-G-3. Eastern quarter, Crossroad D3, 10.014/97-7. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 72. (fig.5). Lekanis 2.2. Shiny grey glaze, red mottled. VEL-G-3. Eastern quarter, 255 Crossroad D3, 10.057/97-5. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 73. (fig.5). Carinated Lid 1. dull, black glaze. VEL-G-4. Eastern quarter, Crossroad D3, 10.061/97-17. Pottery phase C 1 (400-370/60 B.C.E.).
- Cat. 74. (fig.5). Carinated Lid 2. Shiny brownish black glaze. PAE-REG-G-1. Eastern quarter, Crossroad D3, 10.009/97-16. Pottery phase C 2 (370/60-330 B.C.E.).
- Cat. 75. (fig.8). Plate, plain rim 1. Lustrous dark grey glaze. VEL-G-1. Eastern quarter, Crossroad D3, 10.015/97-67. Pottery phase C 3 (330-300 B.C.E.).
- Cat. 76. (fig. 8). Plate, plain rim 1. Lustrous brownish red to dark grey glaze. Mottled. VELG- 1. Eastern quarter, Crossroad D3, 10.015A/97-19. Pottery phase C 3 (330-300 B.C.E.).
- Cat. 77. (fig.8). Plate, plain rim 1. Lustrous black glaze. VEL-G-3. Lower Town, Fortification, wall B, 205/97-11. Pottery phase D 1 (300-275 B.C.E.).
- Cat. 78. (fig.8). Plate, projecting rim. Lustrous, reddish brown glaze, worn. PAE-REG-G-1. Lower Town, Fortification, wall B, 209/99-55. Pottery phase D 2 (275-250 B.C.E.).

Archeometric Analyses of Black Glaze Ware from Velia

Introduction

Among the samples of Black Glaze Ware from Velia of the 5th to the 3rd c. B.C.E., analyzed by mineralogical and petrographic methods, the majority showed a very similar mineralogical and petrographic composition. Based on mineralogical and petrographic criteria, 17 different petrographic types could be distinguished, but due to the fact that for most samples only thin section analysis was possible the provenance interpretation remained problematic and very questionable for many fabrics. Further – with the exception of Paestum – good reference samples and data from other possible production centers are mostly missing. Some fabrics are very similar so that differences in degree of firing, small differences in grain size and the content of carbonate grains/molds of carbonates have been used for fabric

differentiation. Partially also the differences in firing temperature and atmosphere could be responsible for the variation of fabric types. Unfortunately no firing tests have been performed on samples or clay raw materials in order to better understand the changes in the fabrics caused during different firing conditions. Additionally it would be necessary to study more reference material from other production centers of Black Glaze Wares. In this report only five petrographic types are presented for which a Velinian production is very likely or can be assumed with good probability. Some other fabrics for which a regional production in the territory of Velia and/or Paestum can be assumed, but not proven, are also included.⁴⁸

Petrographic types of possible Velinian production (fig.9, tab. 1 – 2)

Petrographic type RVG01 (pl.8)

Samples: M2/49; M2/62; M2/63; M2/64; M2/100; M2/102 (pl.8); M2/105; M2/109; M5/5

Microscopic description

The samples show a reddish-brownish, partly greyish spotted, fine, weakly micaceous, optical active to inactive, non-calcareous groundmass. The average temper content is around 4% (2 – 8%). The average grain size of the temper grains is about 0.02 mm (maximum observed grain size is 0.6 mm). The temper grains consist mainly of muscovite and monocrystalline quartz, subordinate iron oxide concretions, oxidized sheet silicates and potassium feldspars (very rare sericitised). Very rare polycrystalline quartz and heavy minerals and in traces chert, plagioclase and biotite can be found.

The fine, reddish brown “iron oxide concretions” consist of iron oxide cemented clay- and siltstone grains and more often of fine grained iron oxide aggregates and can be interpreted as naturally oxidized components of the raw materials.

The heavy mineral composition (6 samples, 364 grains) consists of augitic clinopyroxen (57%), diopsidic clinopyroxene (15%), brookite/anatase (13%), zircon (7%), rutile (6%), garnet (1%), titanite (1%), traces of epidote/zoisite/clinozoisite and hornblende/amphibole.

Interpretation

The used clay raw material for petrographic fabric type RVG01 most likely is of local, Velinian origin. The mineralogical composition is, especially where representative heavy mineral

⁴⁸ See also the discussion by M. Trapichler in this contribution.

analyses could be achieved, comparable with samples of the fine, practically non calcareous, locally outcropping terrace loams.

Petrographic type RVG01a (pl.9)

Samples: M2/61; M2/91 (pl.9); M2/92; M2/122; M2/123

Microscopic description

The samples show a reddish-brownish, partly mottled, fine, weakly micaceous, optical active to inactive, practically non calcareous groundmass. The average temper content is 4% (2 – 7 %). The average grain size of the temper grains is 0.03 mm (maximum observed grain size is 1.3 mm).

The temper grains consist mainly of muscovite, very frequent monocrystalline quartz, subordinate oxidized sheet silicates and potassium feldspars (partly sericitised), moderate iron oxide concretions, and rare molds of dissolved carbonate grains. Very rare polycrystalline quartz and biotite, traces of chert, plagioclase and heavy minerals occur.

The heavy mineral composition (4 samples, but only 44 grains) consists of augitic clinopyroxene (43%), diopsidic clinopyroxene (30%), brookite/anatase (9%), hornblende/amphibole (7%), zircon (5%) and rutile (2%).

Interpretation

The petrographical composition of petrographic type RVG01a is similar to petrographic type RVG01 and was differentiated only by the very rare occurrence of molds of dissolved carbonate grains. The utilized clay most likely is also of local or regional origin. The mineralogical composition is comparable with samples of fine grained, local terrace loams; also their heavy mineral composition is very similar (in the case where data are available).

Petrographic type RVG02 (pl.10 – 11)

Samples: M2/26; M2/27; M2/50; M2/79 (pl.10); M2/80; M2/82 ; M2/83; M2/85 (pl.11); M2/124

Microscopic description

The samples show within the oxidized areas a brownish to brownish-reddish, partially micaceous optically active to inactive, non-calcareous groundmass. The average temper content is about 11% (5 – 20%). The average grain size of the temper grains is 0.07 mm (maximum grain size is 1 mm).

The temper grains consist mainly of monocrystalline quartz besides muscovite, frequent oxidized sheet silicates and K-feldspars (partially sericitised), subordinate iron oxide concretions, rare polycrystalline quartz, very rare plagioclase, biotite, chert, quartzite and heavy minerals and in traces crystalline rock fragments.

The rare crystalline rock fragments consist mainly of quartzite and quartz-K-feldspar fragments. The heavy mineral composition (10 samples, 1085 grains) consists of brookite/anatase (32%), augitic clinopyroxene (25%), zircon (22%), rutile (8%), diopsidic clinopyroxene (6%), tourmaline (2%), garnet (2%), hornblende/amphibole (2%), titanite (1%) and traces of kyanite, epidote/zoisite/clinozoisite, andalusite, chromian spinel and melanite.

Interpretation

The petrographic type RVG02 is distinguished from petrographic type RVG01 by a significantly higher and also a more coarse grained temper content. The analysed samples of fabric RVG02 most likely are produced from local, non-calcareous, silty clays. The thin section and also the heavy mineral composition are comparable with material from terrace sediments or weathering loams, frequently occurring in the surroundings of Velia.

Petrographic type RVG02a

Sample: M2/125

Microscopic description

The samples exhibit a reddish-brownish, coarse, strongly micaceous, non-calcareous, optical active to inactive, groundmass. The average temper content is about 13% (10 – 14%). The average grain size of the temper grains is 0.07 mm (maximum grain size is 0.4 mm). The temper grains consist mainly of muscovite and oxidized sheet silicates, frequent monocrystalline quartz, subordinate K-feldspars (partly sericitised), moderate iron oxide concretions, rare crystalline rock fragments, very rare polycrystalline quartz, perthite,

plagioclase, biotite, molds of dissolved carbonate grains, quartzite and heavy minerals and traces of foraminifera. The heavy mineral composition (1 sample, 202 grains) consists of brookite/anatase (62%), hornblende/amphibole (14%), augitic clinopyroxene (9%), garnet (8%), diopsidic clinopyroxene (4%), zircon (2%), rutile (1%) and traces of tourmaline.

Interpretation

The strongly micaceous petrographic type RVG02a cannot be interpreted with enough confidence. Based on the heavy mineral composition a relatively local provenance could be possible (mica-rich weathering loams). But such mica rich raw materials have yet not been observed within the analysed raw materials of Velia to date.

Petrographic types of possible regional production (territory of Velia and/or Paestum) (tab. 1 – 2, fig.9)

Petrographic type RVG04a (pl.12 – 14)

Samples: M2/76; M2/77; M2/81 (pl.12); M2/115; M4/1; M4/3; M4/4 ; M4/11

Microscopic description

The samples exhibit a brownish to yellowish-brownish, micaceous optical active to totally inactive, partial weakly, calcareous groundmass. Occasionally, within pore space secondary carbonate precipitations can be observed.

The average temper content is 9% (3 – 15%). The average grain size of the temper grains is 0.05mm (maximum observed grain size: 0.32 mm).The temper grains consist mainly of muscovite besides oxidised sheet silicates, very frequent monocrystalline quartz, frequent K-feldspars (partially sericitised), subordinate iron oxide concretions, rare biotite and molds of dissolved carbonate grains, very rare polycrystalline quartz, chert, plagioclase and heavy minerals and traces of quartzite, volcanic rock particles and other crystalline rock fragments.

The heavy mineral composition (3 samples, 80 grains) consists of brookite/anatase (36%), augitic clinopyroxene (31%), zircon (18%), diopsidic clinopyroxene (9%), hornblende/amphibole (4%), rutile (1%) and garnet (1%).

Interpretation

The provenance of the utilized clays still remains unclear. Local or regional raw materials as well as raw materials from the region of Paestum seem to be possible (especially types with a relatively low carbonate content).

Petrographic type RVG05

Samples: M2/90; M2/94; M2/95; M2/103; M2/108

Microscopic description

The samples show a greyish brownish to brownish, fine grained, micaceous, optically active to entirely inactive, partially calcareous and partially recrystallized groundmass. The average temper content is 4% (3 – 5%). The average grain size of the temper grains is 0.04mm (maximum grain size is 0.3 mm). The temper grains consist mainly of muscovite besides monocrystalline quartz, frequent oxidized sheet silicates and iron oxide concretions, subordinate K-feldspars, moderate molds of dissolved carbonate grains, very rare biotite, polycrystalline quartz, heavy minerals, opaque matter and traces of plagioclase.

The heavy mineral composition (3 samples, 162 grains) consists of augitic clinopyroxene (44%), diopsidic clinopyroxene (18%), brookite/anatase (17%), zircon (14%), rutile (6%), Hornblende/amphibole (1%) and traces of garnet and titanite.

Interpretation

The provenance of the used clays remains unclear. An unknown regional deposit could be possible; however, also raw materials from the region of Paestum cannot be excluded (types with relatively low carbonate content).

(R. Sauer)

MINERALOGICAL COMPOSITION OF TEMPER GRAINS

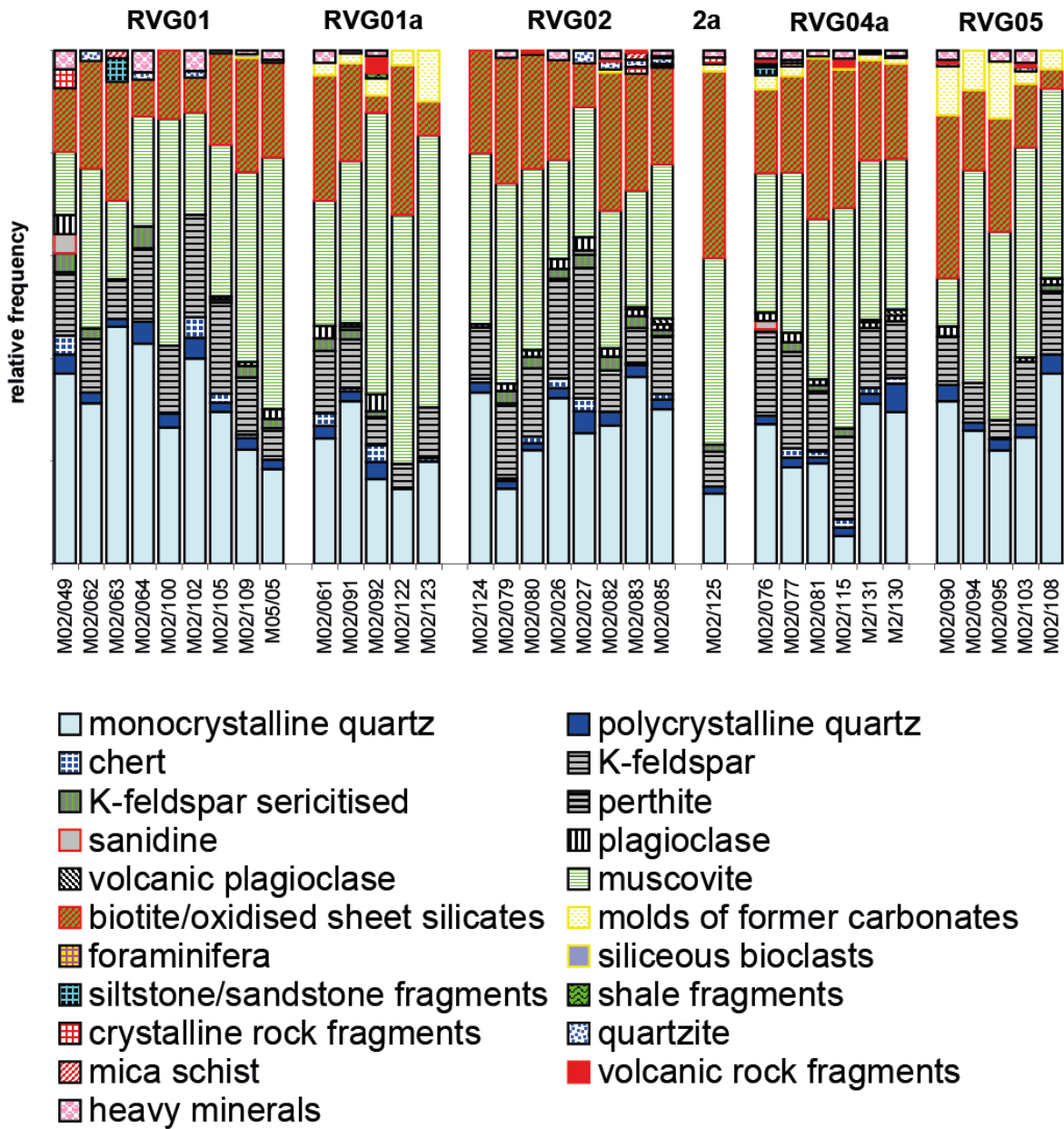


Fig.9. Velia. Black-glaze ware. Petrographic types.

References

- Barra Bagnasco, M. 1989. *Locri Epizefiri III, Cultura materiale e vita quotidiana*. Studi e materiali di archeologia 2. Firenze: Casa Editrice Le Lettere.
- Bernabò Brea, B., and M. Cavalier. 1965. *Meligunìs-Lipara II. La necropoli greca e romana nella contrada Diana*. Rome: "L'Erma" di Bretschneider.
- . 1991. *Meligunìs-Lipara V. Scavi nella necropoli greca di Lipari*. Rome: "L'Erma" di Bretschneider.
- De Caro, S., and S. Di Gregorio. 2010. "Inquadramento delle classe ceramiche." In *Paestum: scavi, ricerche, restauri. I, Le mura: il tratto da Porta Sirena alla Postierla 47*, edited by M. Cipriani and A. Pontrandolfo Greco, 243-84. Paestum: Pandemos.
- Ferrara, B. 2009. *I pozzi votivi nel santuario di Hera di Foce di Sele*, Pozzuoli: Naus.
- Fiammenghi, C. A. 2005. "Il Parco Archeologico di Velia e i risultati della ricerca." In *Velia: atti del quarantacinquesimo convegno di studi sulla Magna Grecia: Taranto, Marina di Ascea, 21-25 settembre 2005*, edited by Istituto per la storia e l'archeologia della Magna Grecia, 551-78. Taranto: Istituto per la storia e l'archeologia della Magna Grecia.
- Gassner, V. 2003. *Materielle Kultur und kulturelle Identität in Elea in spätarchaisch-frühklassischer Zeit. Untersuchungen zur Gefäß- und Baukeramik aus der Unterstadt (Grabungen 1987-1993)*. Velia Studien 2. Wien: Verl. der Österr. Akad. der Wiss.
- Gassner, V., and M. Trapichler. 2011. "Fabrics of Paestum." In FACEM. http://facem.at/img/pdf/Fabrics_of_Paestum_06_06_2011.pdf.
- . Forthcoming. "La ceramica a vernice nera da Velia nel V sec. a. C. – la produzione locale e le sue relazioni con le officine di Poseidonia." In *Fingere ex argilla. Le produzioni ceramiche a vernice nera del golfo di Salerno, Atto del Convegno*, edited by A. Serritella. Salerno: Università degli Studi di Salerno.
- Gassner, V., M. Trapichler, and R. Sauer. 2014. "Pottery Production at Velia: Archaeometric Analyses and the Typological Development of Glazed Ware, Coarse Wares and Transport Amphorae." In *Archeometry. Comparing experiences*, edited by G. Greco and L. Cicala, 191-269. Quaderni del Centro Studi Magna Grecia 19. Pozzuoli: Naus.
- Gualtieri, R., and H. Frachia. 1990. *Roccagloriosa I. L'abitato: scavo e ricognizione topografica*. Naples: Centre Jean Bérard.
- Maffetone, R. 1999. "Ceramiche figurate di età classica da Velia." In *Neue Forschungen in Velia. Akten des Kongresses "La ricerca archeologica a Velia" (Rom, 1.-2. Juli 1993). Veranstaltet vom Historischen Institut beim Österreichischen Kulturinstitut in Rom und von der Soprintendenza archeologica per le province di*

Salerno, Avellino e Benevento, edited by F. Krinzinger and G. Tocco, 85-108. Velia Studien 1. Wien: Verl. der Österr. Akad. der Wiss.

Morel, J.-P. 1981. *Céramique Campanienne: Les Formes*. Rome: École française de Rome.

Pemberton, E.G. 1997. "Corinthian Black Glaze Pottery with incised and stamped decoration." *Hesperia* 66: 49-97.

Pontrandolfo, A., and A. Rouveret. 1992. *Le tombe dipinte di Paestum*. Modena: Panini.

Pontrandolfo, A. 2000. "La ceramica attica di IV secolo in area tirrenica." In *La céramique attique du IVe siècle en Méditerranée occidentale. Actes du colloque international organisé par le Centre Camille Jullian, Arles 7 - 9 décembre 1995*, edited by B. Sabattini, 121-30. Naples: Centre Jean Bérard.

Sparkes, B., and L. Talcott. 1970. *Black and Plain Pottery of the 6th and 5th century B.C.* The Athenian Agora XII. Princeton, N.J.: American School of Classical Studies at Athens.

Trapichler, M. 2003. "Ceramica a vernice nera di età classica da Elea: produzione locale ed importazioni" In *Elea-Velia. Le nuove ricerche. Atti del Convegno di Studi, Napoli, 14 dicembre 2001*, edited by G. Greco, 207-16. Pozzuoli: Naus.

—. 2006. "Kontinuität und Veränderung. Studien zur Keramik spätklassischer und hellenistischer Zeit aus Velia." Ph.D.diss., Vienna University.

Trendall, A.D., and I. McPhee. 1987. *Greek red-figured Fish Plates. AntK Beih.14*. Basel: Vereinigung der Freunde antiker Kunst.

Vecchio, L. 2012. "Velia." In *Bibliografia Topografica della Colonizzazione Greca in Italia e nelle Isole Tirreniche, G. Nenci - G. Vallet, XXI. Siti. Torre Castelluccia - Zambrone*, edited by M. I. Gulletta e C. Cassanelli, 588-719. Pisa - Roma – Napoli: Scuola Normale Superiore, Ecole Française de Rome.



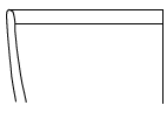
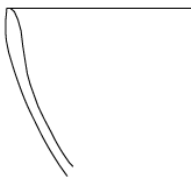
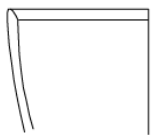
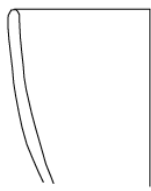
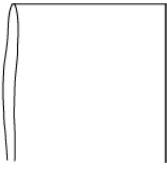

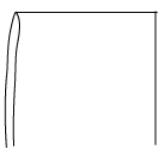


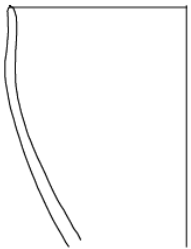

This article should be cited as: Trapichler, M., and R. Sauer. 2015. "Black Glaze Ware of Velia" In FACEM (version 06/06/2015) (<http://www.facem.at/project-papers.php>).


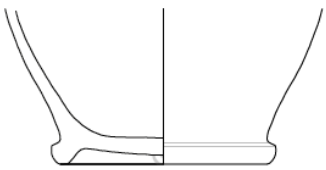
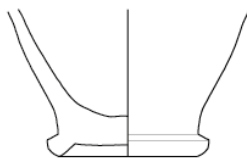

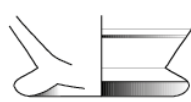
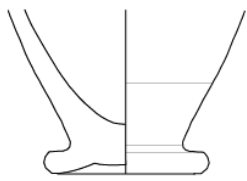
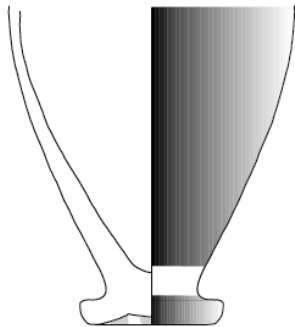
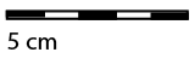
Annex 1: list of samples analyzed by thin section and heavy mineral analysis


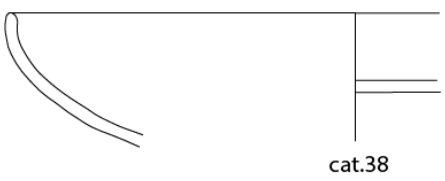
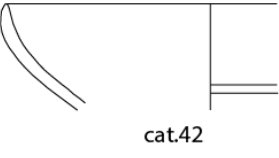
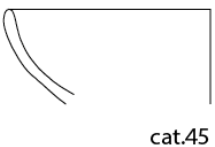
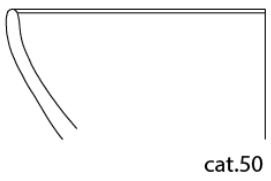
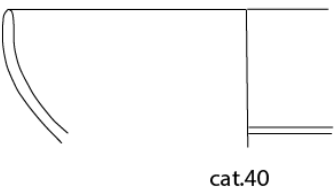
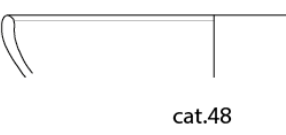

Reference piece in bold letters

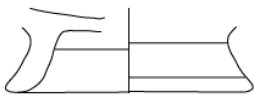
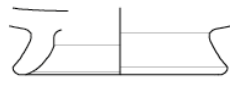
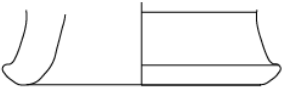
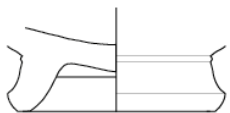

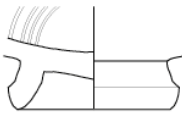

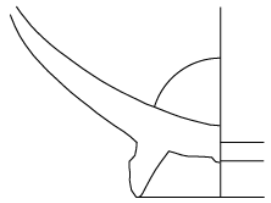
| Fabric | Petr. Type | No. of Sample | Reg. No. | Form/Description | Context | Pottery phase |
|----------------|---------------|---------------|----------------|---|--|---------------|
| VEL-G-1 | RVG01 | M2/49 | 58/71-2 | Banded cup. Plain rim. Partially glazed | Acropolis | - |
| VEL-G-1 | RVG01 | M2/61 | 518/94 | Open vessel, body fragment. Lustrous dark grey glaze with metallic reflections | Theatre | - |
| VEL-G-1 | RVG01 | M2/62 | 46/89 | Bowl, body fragment. Lustrous, yellowish red glaze, interior: mottled with grey | Lower Town; Crossroad | B 2 |
| VEL-G-1 | RVG01 | M2/63 | 46/89 | Closed vessel, body fragment. Lustrous, yellowish red glaze, dull interior | Lower Town; Crossroad | B 2 |
| VEL-G-1 | RVG01 | M2/64 | 44/90 | Skyphos, rim with handle. Exterior and handle: Lustrous, dark grey glaze, interior: fired red | Lower Town; Crossroad, trench 1/90 | B 2 |
| VEL-G-1 | RVG01 | M2/100 | 27/90 | Cup or cup skyphos, ring foot. Lustrous black glaze. | Lower Town; Crossroad | B 2 |
| VEL-G-1 | RVG01 | M2/102 | 57/90-7 | Bowl. Plain rim. Very dark grey, 5YR3/1, to dark reddish brown glaze, 5YR3/2; Rim diameter: 13 cm. | Lower Town; Crossroad | B 2 |
| VEL-G-1 | RVG01 | M2/105 | 25A/90 | Bowl, elevated ringfoot. Lustrous black glaze, exterior of foot and underside of bottom: reserved | Lower Town; Crossroad | B 3 |
| VEL-G-1 | RVG01 | M2/109 | 250/91 | Skyphos. Ring foot. Lustrous black glaze | Insula II | B 2 |
| VEL-G-1 | RVG01 | M5/5 | 25a/90 | Banded cup. Plain rim. Partially Glazed Ware | Lower Town; Crossroad | B3 |
| VEL-G-2 | RVG01a | M2/91 | 27/90 | Bowl, body fragment. Lustrous black glaze, exterior: horizontal stripe reserved | Lower Town; Crossroad | B2 |
| VEL-G-2 | RVG01a | M2/92 | 46/89 | Skyphos, body fragment. Lustrous glaze, mottled reddish yellow to dark brown | Lower Town; Crossroad | B2 |
| VEL-G-2 | RVG01a | M2/122 | 27/90 | Open vessel, body fragment. brownish dark grey glaze | Lower Town; Crossroad | B2 |
| VEL-G-2 | RVG01a | M2/123 | 27/90 | Open vessel, body fragment. Dark red glaze | Lower Town; Crossroad | B2 |
| VEL-G-2 | RVG02 | M2/124 | 27/90 | Skyphos, base. very dark grey glaze | Lower Town; Crossroad | B2 |
| VEL-G-2 | RVG 05 | M2/90 | 1119/93 | Open vessel, body fragment. Lustrous black glaze | Theatre | B2/B3 |
| VEL-G-3 | RVG02 | M2/79 | 18/90 | Closed shape, body fragment. Dull dark grey glaze, worn | Lower Town; Crossroad | B 3 |
| VEL-G-3 | RVG02 | M2/80 | 18/90 | Skyphos, base. Lustrous black glaze. | Lower Town; Crossroad | B 3 |
| VEL-G-3 | RVG02 | M2/125 | 215/96-7 | Cup, foot. Dark brown glaze | Acropolis | B 1 |
| VEL-G-4 | RVG02 | M2/26 | 424/90-5 | Ring foot, dull black glaze. Gassner 2003, IIa.90 | Insula II, Late Archaic mud brick houses | B 1 |
| VEL-G-4 | RVG02 | M2/27 | 6012/92-2 | Cup, base. Exterior: greenish brown dull glaze, interior: worn. Gassner 2003, IIa.82 | Insula II, Late Archaic mud brick houses | B 1 |
| VEL-G-4 | RVG02 | M2/82 | 25A/90 | Bowl, body fragment. Lustrous black glaze, interior towards | Lower Town; Crossroad | B 3 |

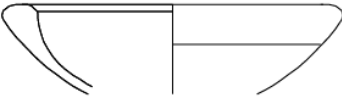



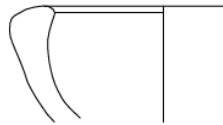
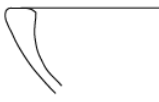
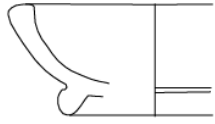
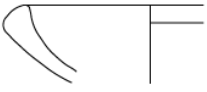
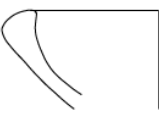

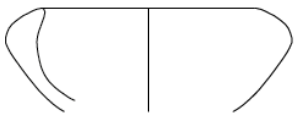


| | | | | | | |
|--------------------|---------------|---------------|--------------------|---|----------------------------------|------------|
| | | | | bottom: yellowish brown. | | |
| VEL-G-4 | RVG02 | M2/83 | 28/90 | Bowl, plain rim. Lustrous brownish black glaze. | Lower Town; Crossroad | B 2 |
| VEL-G-4 | RVG02 | M2/85 | 22/90 | Closed vessel, body fragment. Dull black glaze. | Lower Town; Crossroad | B 2 |
| VEL-REG-G-1 | RVG04a | M2/115 | 24/90 | Bowl, elevated ring foot. Very dark grey glaze, 5YR3/1 | Lower Town; Crossroad | B 3 |
| VEL-REG-G-1 | RVG04a | M2/81 | 25A/90 | Bowl, base. Lustrous black glaze, interior towards bottom reddish brown | Lower Town; Crossroad | B 3 |
| VEL-REG-G-1 | RVG04a | M2/76 | 25A/90 | Skyphos, base. Lustrous dark grey glaze, metallic reflections. | Lower Town; Crossroad | B 3 |
| PAE-REG-G-1 | RVG04a | M2/131 | 10.047/97-3 | Cup skyphos, molded ring foot. Black to reddish brown glaze, reddish brown, streaky. | Vignale, crossroad D3 | |
| PAE-REG-G-2 | RVG04a | M2/130 | 10.074/97-8 | Skyphos, handle. Lustrous black glaze. | Vignale, crossroad D3 | C 1 |

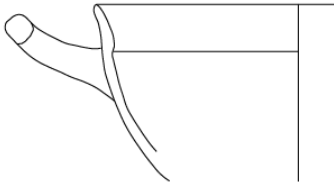

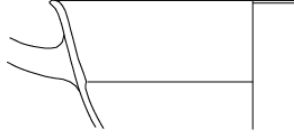

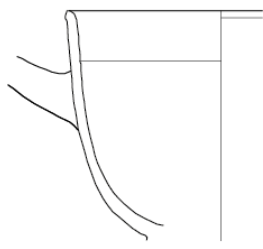

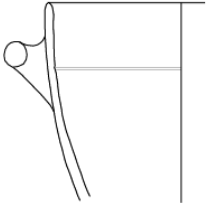

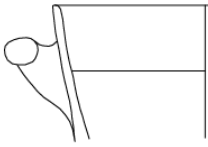
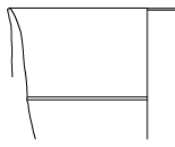
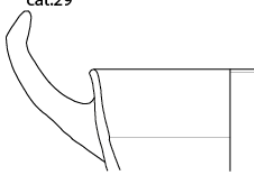
| | Phase B | Phase C | Phase D |
|------------|--|--|---|
| rim type 1 |  cat.1 | | |
| rim type 2 |  cat.2 |  cat.5 | |
| rim type 3 |  cat.3 |  cat.6 |  cat.10 |
| rim type 4 |  cat.4 |  cat.7  cat.8 |  cat.11 |
| rim type 5 | |  cat.9 |  cat.12 |
| |  5 cm | | |

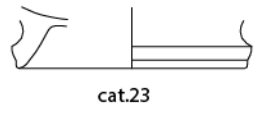
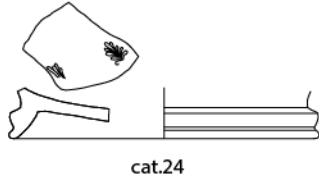
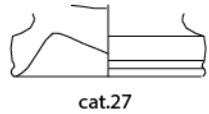
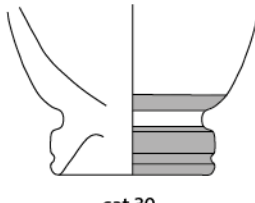
| | Phase B | Phase C | Phase D |
|--------------------|---|--|---|
| ringfoot 1 |  <p>cat.13</p> | | |
| ringfoot 2 | |  <p>cat.15</p>  <p>cat.16</p> | |
| flaring ringfoot 1 |  <p>cat.14</p> |  <p>cat.17</p> | |
| flaring ringfoot 2 | | |  <p>cat.18</p>  <p>cat.19</p>  <p>5 cm</p> |

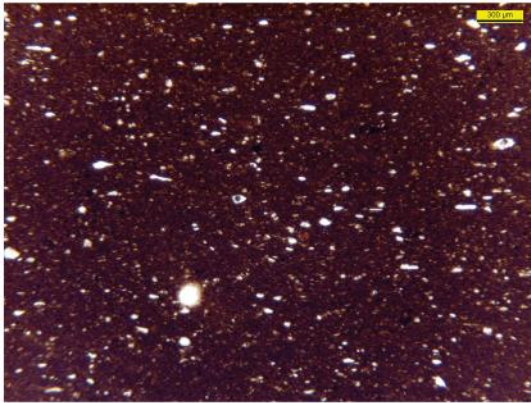
| | Phase B | Phase C | Phase D |
|---------------|---|---|--|
| Plain rim 1.1 | |  cat.44 | |
| Plain rim 1.2 |  cat.38 | | |
| Plain rim 2.1 | |  cat.42  cat.45 |  cat.50 |
| Plain rim 2.2 |  cat.40 |  cat.48 | |
| |  5 cm | | |

| | Phase B | Phase C | Phase D |
|------------------------|---|---|---|
| high ringfoot 1.1 |  <p>cat.39</p> |  <p>cat.43</p> | |
| high ringfoot 1.2 |  <p>cat.41</p> | | |
| high ringfoot 2.2 | |  <p>cat.46</p> | |
| high ringfoot 2.3 | |  <p>cat.47</p> | |
| high ringfoot 3 | |  <p>cat.49</p> | |
| high slim ringfoot 1.2 |  | |  <p>cat.51</p> |

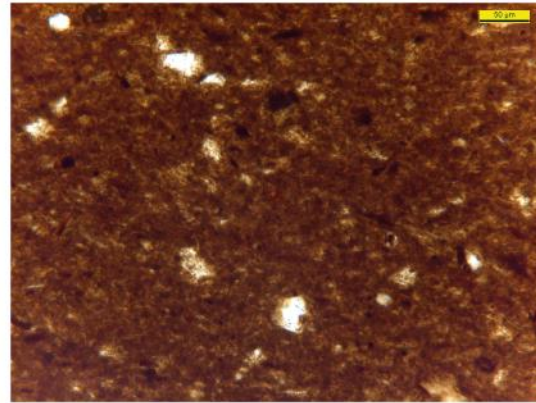
| | Phase B | Phase C | Phase D |
|------------------------|--|--|--|
| thickened rim 1.3.1 |  <p>cat.55</p> |  <p>cat.57</p>  <p>cat.58</p> | |
| thickened rim 1.3.2 | |  <p>cat.59</p> |  <p>cat.76</p> |
| thickened rim 2.3 |  <p>cat.56</p> | | |
| echinus rim 1 |  <p>cat.52</p> | | |
| echinus rim 2 |  <p>cat.53</p>  <p>cat.54</p> | | |
| echinus rim 4 |  |  <p>cat.60</p> |  <p>cat.61</p>  <p>cat.62</p> |

| | Phase B | Phase C | Phase D |
|----------------------|---|--|--|
| Inset Lip 2.2 . |  <p>cat.20</p> |  <p>cat.21</p> | |
| Rim Of fset inside 1 | |  <p>cat.22</p> | |
| Rim Of fset inside 2 | |  <p>cat.25</p> | |
| Rim Of fset inside 3 | |  <p>cat.26</p> | |
| Rim Of fset inside 4 | | |  <p>cat.28</p>  <p>cat.31</p> |
| Rim Of fset inside 5 |  <p>5 cm</p> | |  <p>cat.29</p>  <p>cat.32</p>  <p>cat.33</p> |

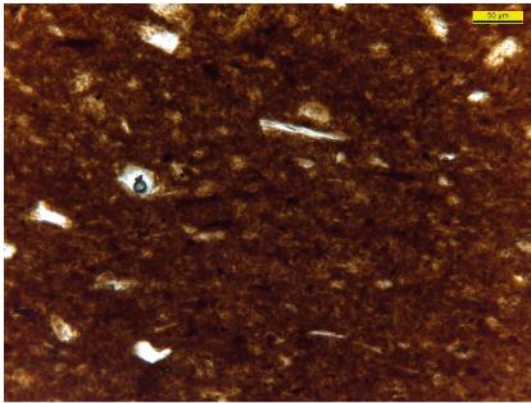
| | Phase C | Phase D |
|-----------------------------|---|--|
| molded ringfoot 3.1 |  <p>cat.23</p> | |
| molded ringfoot 3.2 |  <p>cat.24</p> | |
| high slim molded ringfoot 1 |  <p>cat.27</p> | |
| high slim molded ringfoot 2 | |  <p>cat.30</p> |



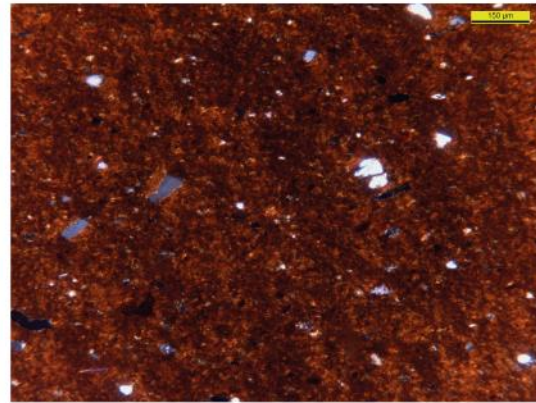
RVG01
VEL-G-1
M2/102
thin section overview; //pol



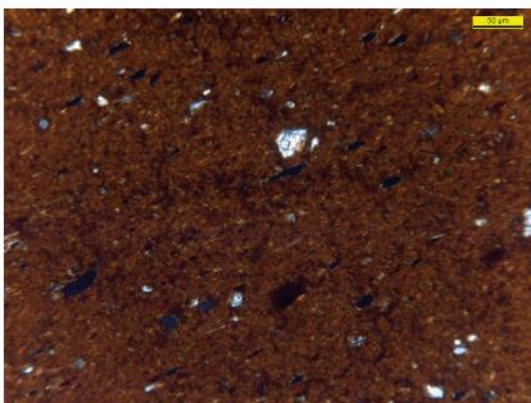
RVG01
VEL-G-1
M2/102
thin section overview; //pol



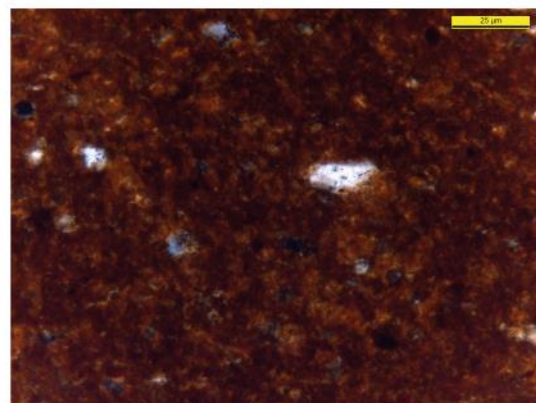
RVG01
VEL-G-1
M2/102
thin section overview; //pol



RVG01
VEL-G-1
M2/102
thin section overview; #pol



RVG01
VEL-G-1
M2/102
thin section overview; #pol

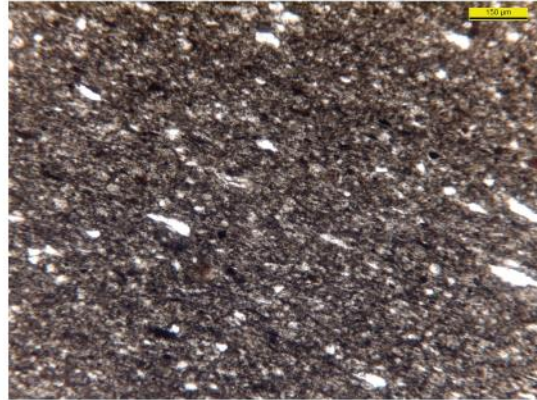


RVG01
VEL-G-1
M2/102
thin section overview; #pol

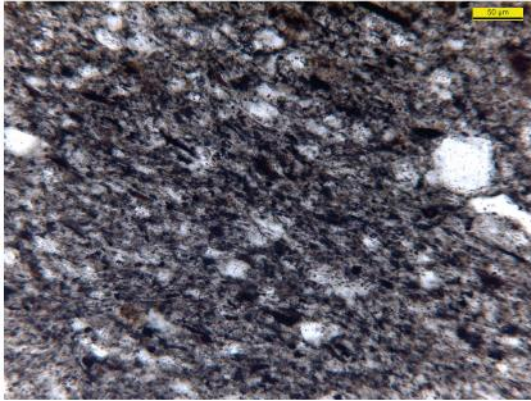
Pl. 9



RVG01a
VEL-G-2
M2/91
thin section overview; //pol



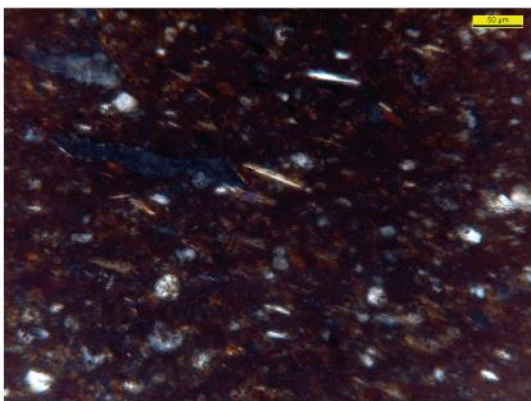
RVG01a
VEL-G-2
M2/91
thin section overview; //pol



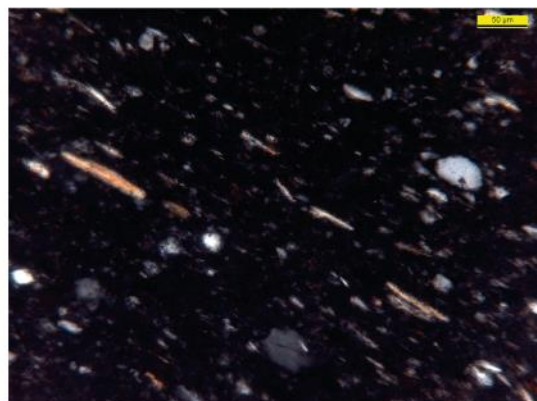
RVG01a
VEL-G-2
M2/91
thin section overview; //pol



RVG01a
VEL-G-2
M2/91
thin section overview; #pol

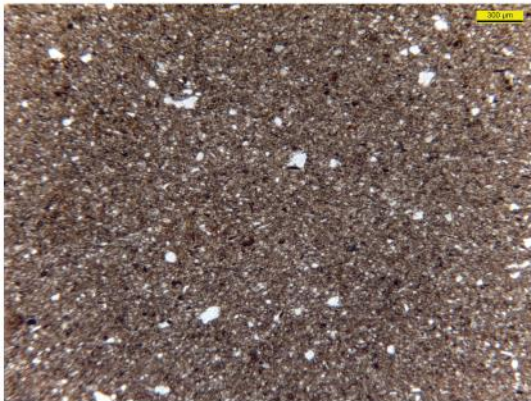


RVG01a
VEL-G-2
M2/91
thin section overview; #pol

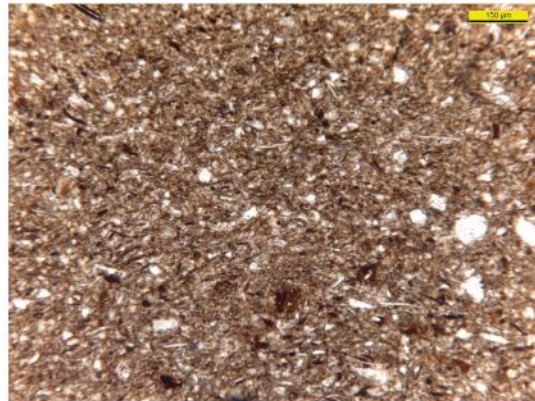


RVG01a
VEL-G-2
M2/91
thin section overview; #pol

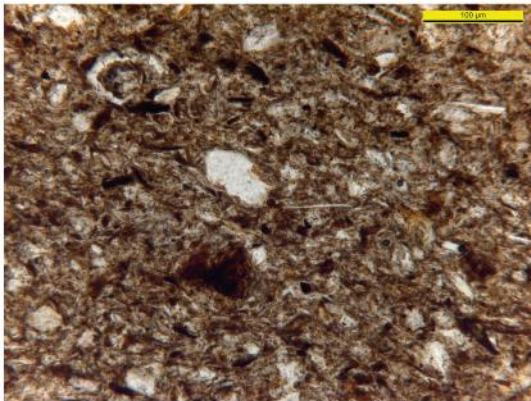
Pl. 10



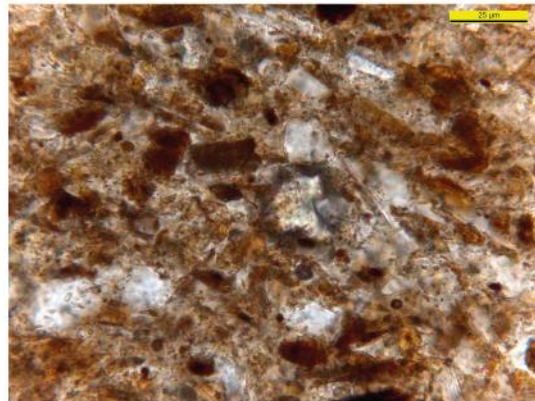
RVG02
VEL-G-3
M2/79
thin section overview; //pol



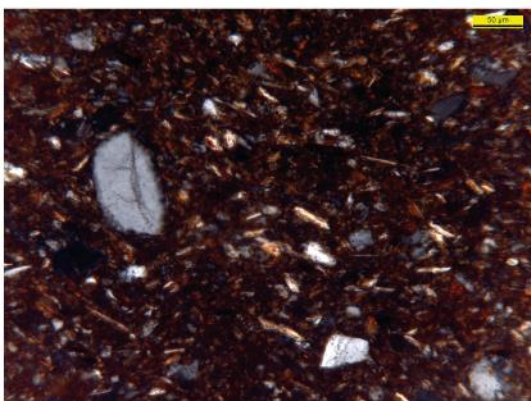
RVG02
VEL-G-3
M2/79
thin section overview; //pol



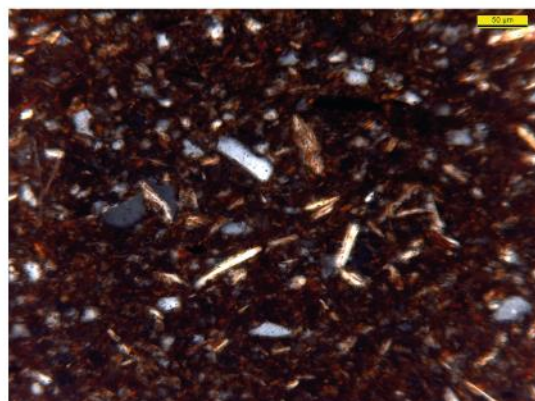
RVG02
VEL-G-3
M2/79
thin section overview; //pol



RVG02
VEL-G-3
M2/79
thin section overview; //pol

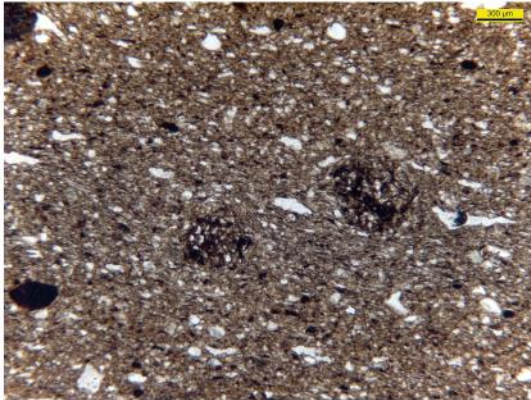


RVG02
VEL-G-3
M2/79
thin section overview; #pol

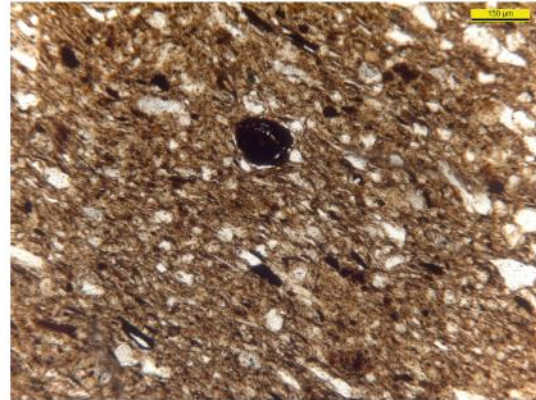


RVG02
VEL-G-3
M2/79
thin section overview; #pol

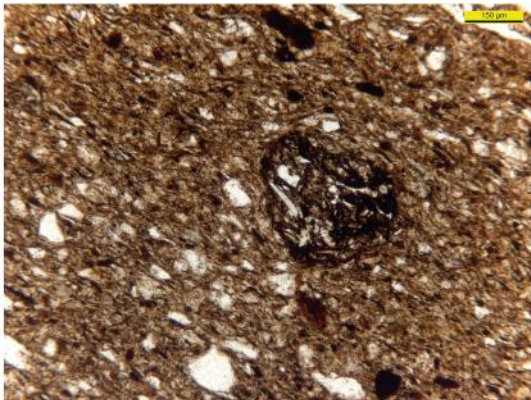
Pl. 11



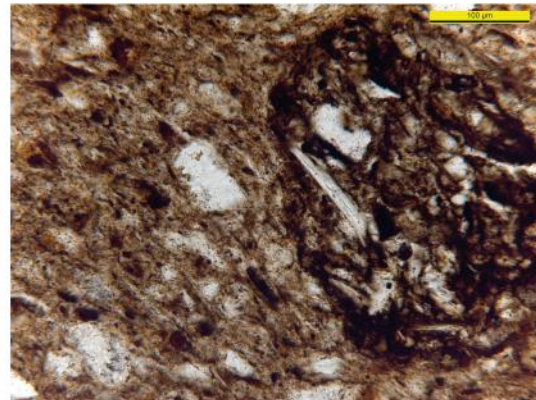
RVG02
VEL-G-4
M2/85
thin section overview; //pol



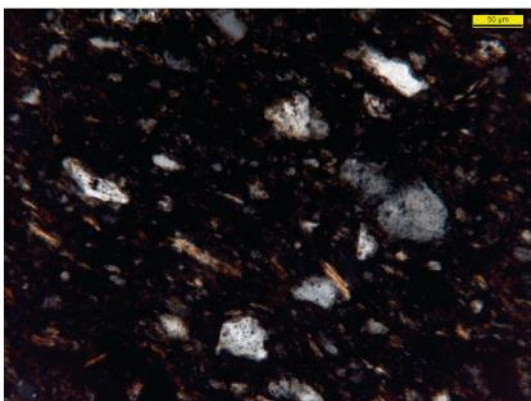
RVG02
VEL-G-4
M2/85
thin section overview; //pol



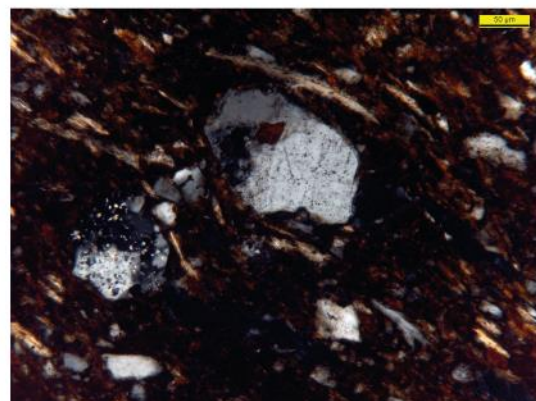
RVG02
VEL-G-4
M2/85
thin section overview; //pol



RVG02
VEL-G-4
M2/85
thin section overview; //pol

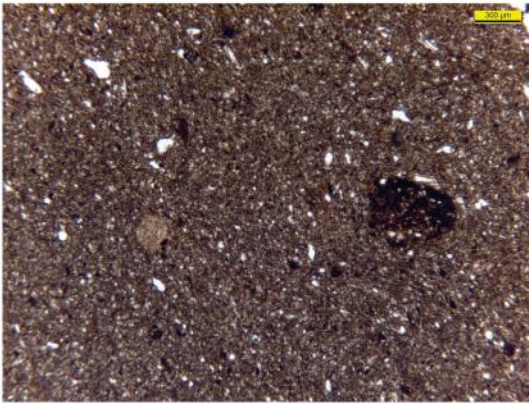


RVG02
VEL-G-4
M2/85
thin section overview; #pol

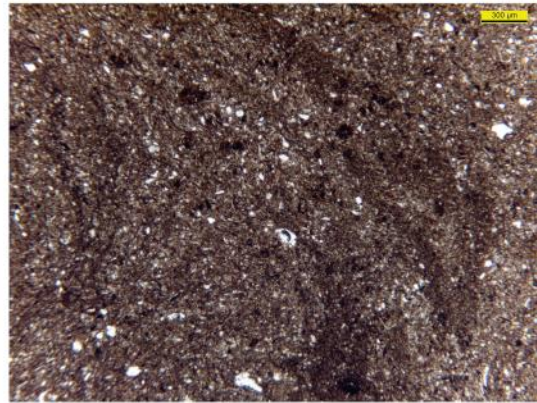


RVG02
VEL-G-4
M2/85
thin section overview; #pol

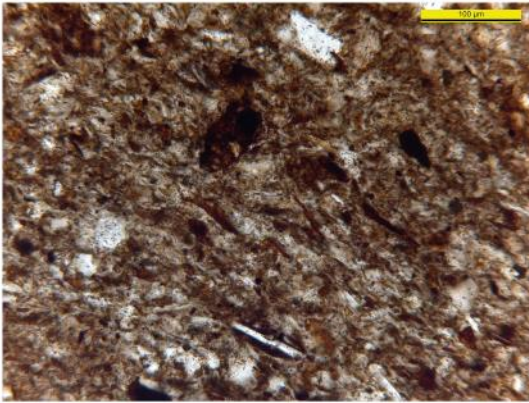
Pl. 12



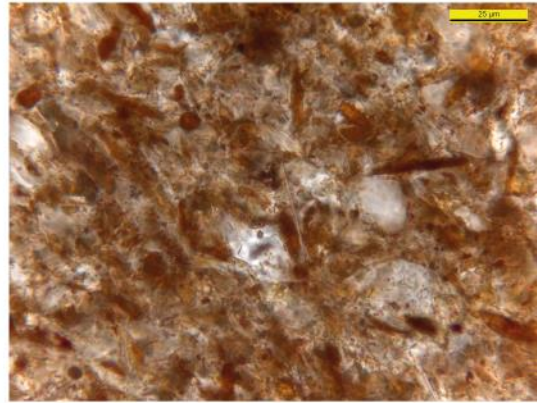
RVG04a
VEL-REG-G-1
M2/81
thin section overview; //pol



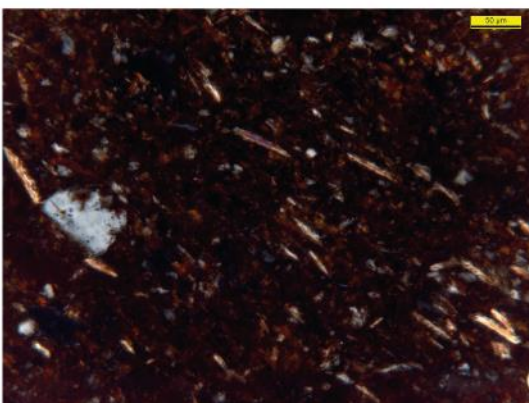
RVG04a
VEL-REG-G-1
M2/81
thin section overview; //pol



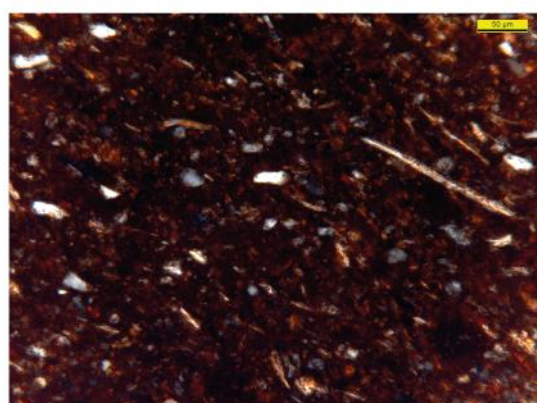
RVG04a
VEL-REG-G-1
M2/81
thin section overview; //pol



RVG04a
VEL-REG-G-1
M2/81
thin section overview; //pol



RVG04a
VEL-REG-G-1
M2/81
thin section overview; #pol

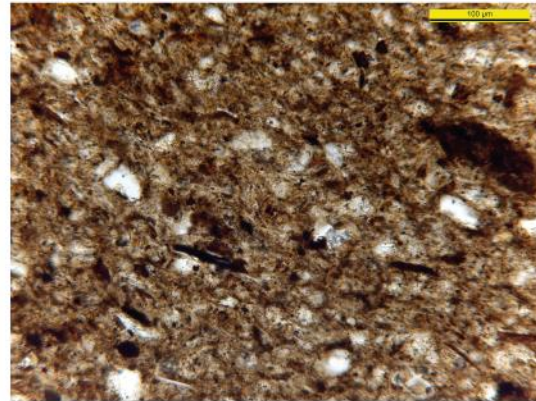


RVG04a
VEL-REG-G-1
M2/81
thin section overview; #pol

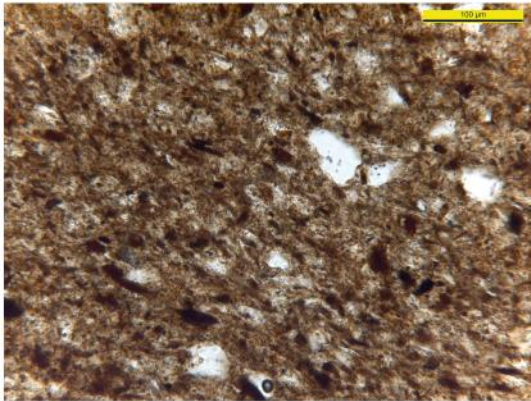
Pl. 13



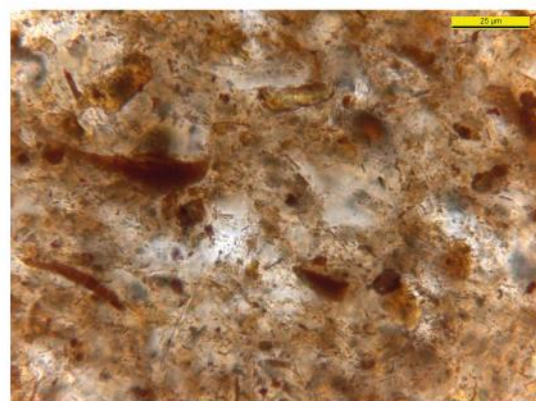
RVG04a
PAE-REG-G-1
M2/131
thin section overview; //pol



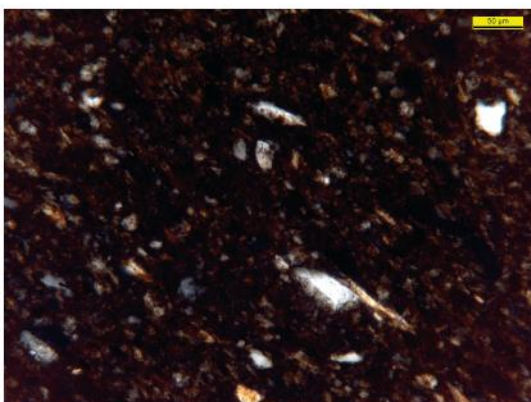
RVG04a
PAE-REG-G-1
M2/131
thin section overview; //pol



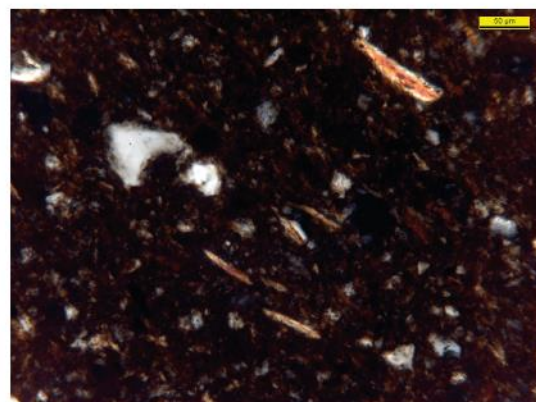
RVG04a
PAE-REG-G-1
M2/131
thin section overview; //pol



RVG04a
PAE-REG-G-1
M2/131
thin section overview; //pol

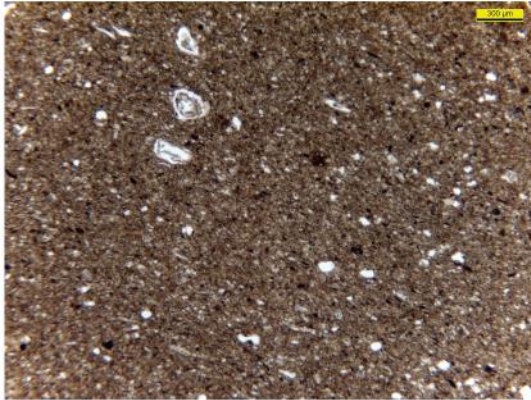


RVG04a
PAE-REG-G-1
M2/131
thin section overview; #pol

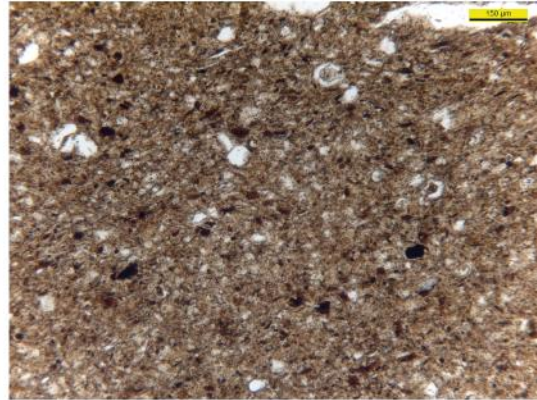


RVG04a
PAE-REG-G-1
M2/131
thin section overview; #pol

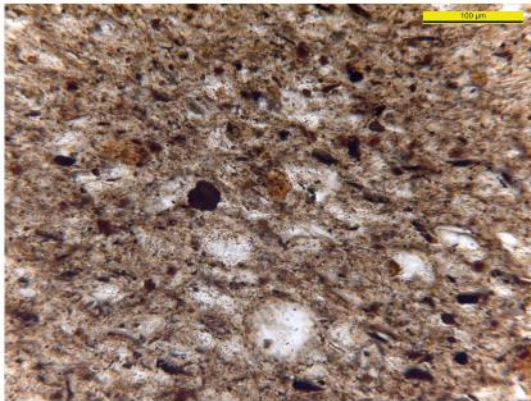
Pl. 14



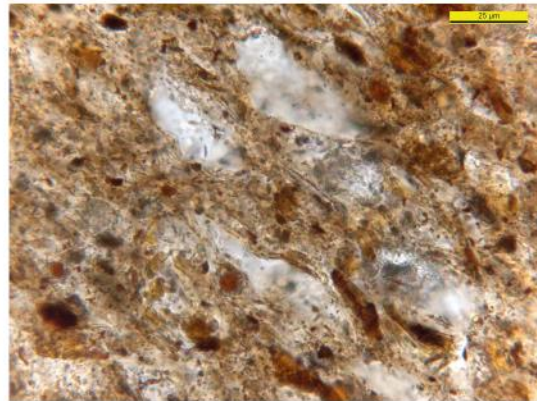
RVG04a
PAE-REG-G-2
M2/130
thin section overview; //pol



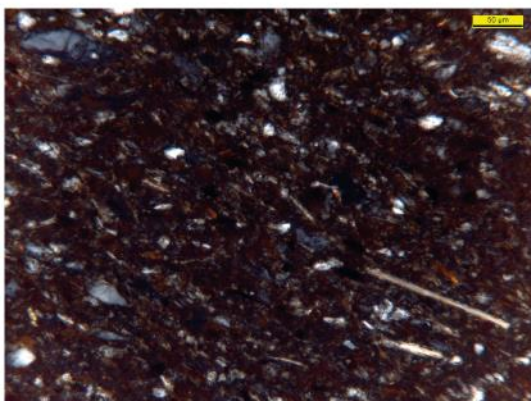
RVG04a
PAE-REG-G-2
M2/130
thin section overview; //pol



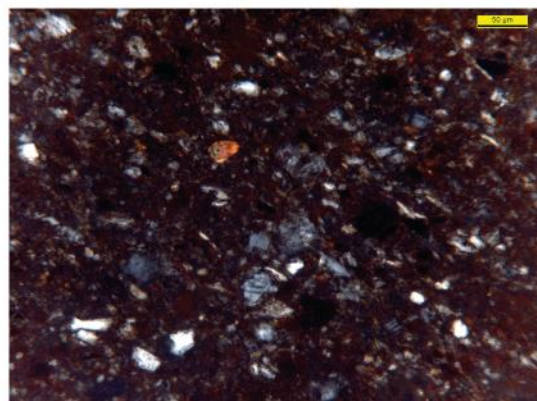
RVG04a
PAE-REG-G-2
M2/130
thin section overview; //pol



RVG04a
PAE-REG-G-2
M2/130
thin section overview; //pol



RVG04a
PAE-REG-G-2
M2/130
thin section overview; #pol



RVG04a
PAE-REG-G-2
M2/130
thin section overview; #pol