NEW PETROGRAPHIC DATA OF THE LAECANIUS AND IMPERIAL WORKSHOP IN FAŽANA (ISTRIA, CROATIA)

[1]T. Bezeczky – [2]M.A. Mange

[1]Institute for Studies of Ancient Culture, Austrian Academy of Sciences, Vienna
t.bezeczky@gmx.at
[2]Department of Geology, University of California, Davis USA
mange@geology.ucdavis.edu

Abstract: *The fabric of the Dressel 6B amphorae produced in the Fažana workshop, owned by various owners during its existence, changed very little over one hundred years. Production was ceased during the reign of emperor Hadrian. When, after a few decades, production was resumed, the Fažana workshop produced amphorae with different shapes. Although petrological analysis of the paste shows slight differences, this does not prove that major changes occurred in production technology. It seems likely, however, that the raw material was obtained from different clay beds.*

Keywords: *amphora, pottery workshop, heavy minerals, fabric groups, Roman trade.*

INTRODUCTION

From the end of the first century BC to around the last third of the second century AD an amphora workshop of great significance existed on the Istrian Peninsula (Croatia) that is now situated beneath the modern town of Fažana. Very good preservation enabled its examination and detailed reconstruction, including the kiln and storage cellars while the precise labelling of the amphorae by double stamps provided a record of its whole history (*Bezeczky 1998; Mange & Bezeczky 2006*). Besides the workshop, the owners' villas were also excavated on the nearby island of Brijuni where olive oil was produced and filled into the amphorae. This workshop and villa complex is considered as one of the best understood of the period. During the first century AD its owners were successive members of an influential Roman family, the Laecanii. Towards the end of the 70s the last Laecanius died without an heir and the ownership was taken over by the Emperor.

The Laecanius amphorae are defined as Dressel 6B type that is a typical product of the Istrian peninsula. Each amphora was labelled by two stamps on the rim. The stamp of Laecanius was placed at the centre and a second stamp, the vilicus's (estate manager) stamp, above the handle. The stamps of successive vilici on the amphorae assist in their identification and differentiation. Names of more than 40 successive vilici have been preserved in these stamps, thus providing a relative chronology for the workshop (*Bezeczky 1998*).

Roman amphorae are rarely marked with two stamps. This unique feature, combined with an excellent historical record, makes it desirable to obtain information on the material used, techniques adopted and to detect notable changes between amphorae manufactured during the ownership of the Laecanius family and then the Emperor. Archaeometric analyses with the integration of archaeological and geological techniques are highly suitable for such an enquiry. *Mange & Bezeczky (2006; 2007)* demonstrated the potential of this technique in a study of amphorae sherds made during the ownership of the Laecanius family. It was possible to pinpoint the sources of paste and temper, and they also showed that amphorae marked by the same stamps were made of differing material, suggesting that either they were not made at the same time or raw material was obtained from more than one source. The annual output was around 12,000 amphorae that demanded a continuous supply of large amounts of raw material which had to be transported to the locality of the workshop.

The topic of this paper is the diachronic study of amphorae fabrics, produced during the three periods of production at the Fažana workshop in Istria, Croatia. We shall introduce what is known about the owners of the workshop in its different periods of use, followed by a petrological analysis of the relevant phase. The aim of the analyses is to account for any changes in raw material sources exploited and production technologies used which in turn gives us information on potential improvement or decline in organisation and manufacturing, also, changes in raw material acquisition and related transport.

FIRST PERIOD OF THE WORKSHOP

The Mediterranean climate of Istria is perfectly suited to producing olive-oil and wine. Ancient literary sources mention the excellence of the Istrian olive-oil (Pliny the Elder NH 15.9 and Martial 12.63). From Pula to Tergeste traces of several villas with olive-producing facilities have been discovered. The Roman proprietors of the villas had their own oil presses, storage cellars and

Fig. 1 Map of Roman Istria

ceramic workshops. The owners of the properties were mainly senators and members of the Roman elite. One of the best-known owners was the Laecanius family. The first famous member of the family is Caius Laecanius Bassus who was preator urbanus in 32 AD and consul suffectus in 40 AD (PIR2, L 30; *Alföldy 1982; Tassaux 1982*). His son with the same name was consul ordinarius in 64 AD (PIR2, L 31; *Alföldy 1982; Tassaux 1982*). The family attained great wealth in a very short time from the production and commerce of olive-oil, then held various offices, and became members of the equestrian aristocracy and later the Senate. They owned a villa and a workshop at Fažana, 9 km north of Pula (*Gnirs 1910; Gnirs 1910a; Gnirs 1911*). No large scale excavation is possible in Fažana, since the modern town is built over the ancient ruins. Besides their estates in Fažana, three other villas were discovered on the Island of Brijuni. (**Fig. 1**) No other owner's stamps were found there, so these villas were interpreted as being also the property of the Laecanius family (*Tassaux 1982; Zaccaria 1989; Bezeczky 1998*). The Val Catena (Verige bay) villa was a luxurious maritime-villa with elegant peristyles and colonnades, developed atria, bathrooms and an industrial area with oil presses and a cellar. Another villa rustica (Monte Collisi – Kolci Hill) also existed on the north-western part of the island. The three wings of this villa were built around a central courtyard. The kitchen, presses and the large cellar were east of them. The third villa in Dobrika Bay (Castrum), is in the western part of the Island. This villa was surrounded by a late Roman/Byzantine fortress (Castrum). The excavations unearthed a central courtyard, a cistern, presses, millstones, and two storage cellars among the early Imperial buildings (*Matijašić 1982; Bezeczky 1998*). In the three villas, the maximum storage capacity of the cellars was about 12,000 amphorae annually, plus the unknown quantity in Fažana (*Bezeczky 1998*). Despite our incomplete knowledge, it is quite obvious that the kiln was very large. The debris alone is more than one meter deep. Even the nearby church was built of the debris of the figlina (workshop). The products of the figlina include Dressel 6B amphorae, stoppers, dolia (capacity ~ 1500 litre), tiles, clay lamps, heating pipes and spicae. The volume of production can only be guessed at on the basis of the amphorae which were found in more than 50 sites in Cisalpina, Noricum, Pannonia and Raetia over the last 100 years (*Bezeczky 1998; Cipriano 2001*). The Dressel 6B type is a typical product of the Istrian peninsula (*Carre 1985; Pesavento et al. 1992; Bezeczky 2004*). Recent rescue-excavations contributed to the clarification of both the forms of the ceramics produced at the workshop and the periods of the figlina (*Bezeczky & Pavletić 1996*). During the first period (from the end of the 1st century BC to the Flavian period, i.e., AD 78), the workshop was the property of the Laecanius gens. Beside the stamp of Laecanius on the amphorae the names and stamps of more than 40 successive vilici (estate managers) have been recorded (e.g. Amicus, Amethystus, Clarus, Clymenus, Datus, Eucharistus, Felix, Hermes, Ialysus, Martius, Optatus, Paganus, Pierus, Speratus, Urbanus, Viator etc.) providing a relative chronology for the workshop (*Bezeczky 1998*).

Petrology

Fabric analysis was carried out under a stereo microscope. Characteristics of the fabric allowed categorisation of the amphorae into nine fabric groups A-I. Petrography showed that quartz is the dominant clastic component while carbonate is common as temper. X-ray powder diffraction (XRD) analysis identified quartz as the dominant mineral phase in all samples. Plagioclase feldspars, illite and other mica were found only in low proportions. XRD provided the key for the reconstruction of firing-temperatures that varied between 750-900°C; Weiszburg (as cited in *Józsa et al., 1994*). Qualitative and quantitative analyses of the amphora sherds in thin sections were conducted earlier by Sándor Józsa, Roman Sauer and György Szakmány (*Józsa et al. 1994*). Clastic particles include monocrystalline quartz, polycrystalline quartz, low quantities of plagioclase and potassium-feldspar, and small amounts of chert. Micas are biotite and fine flakes of white mica.

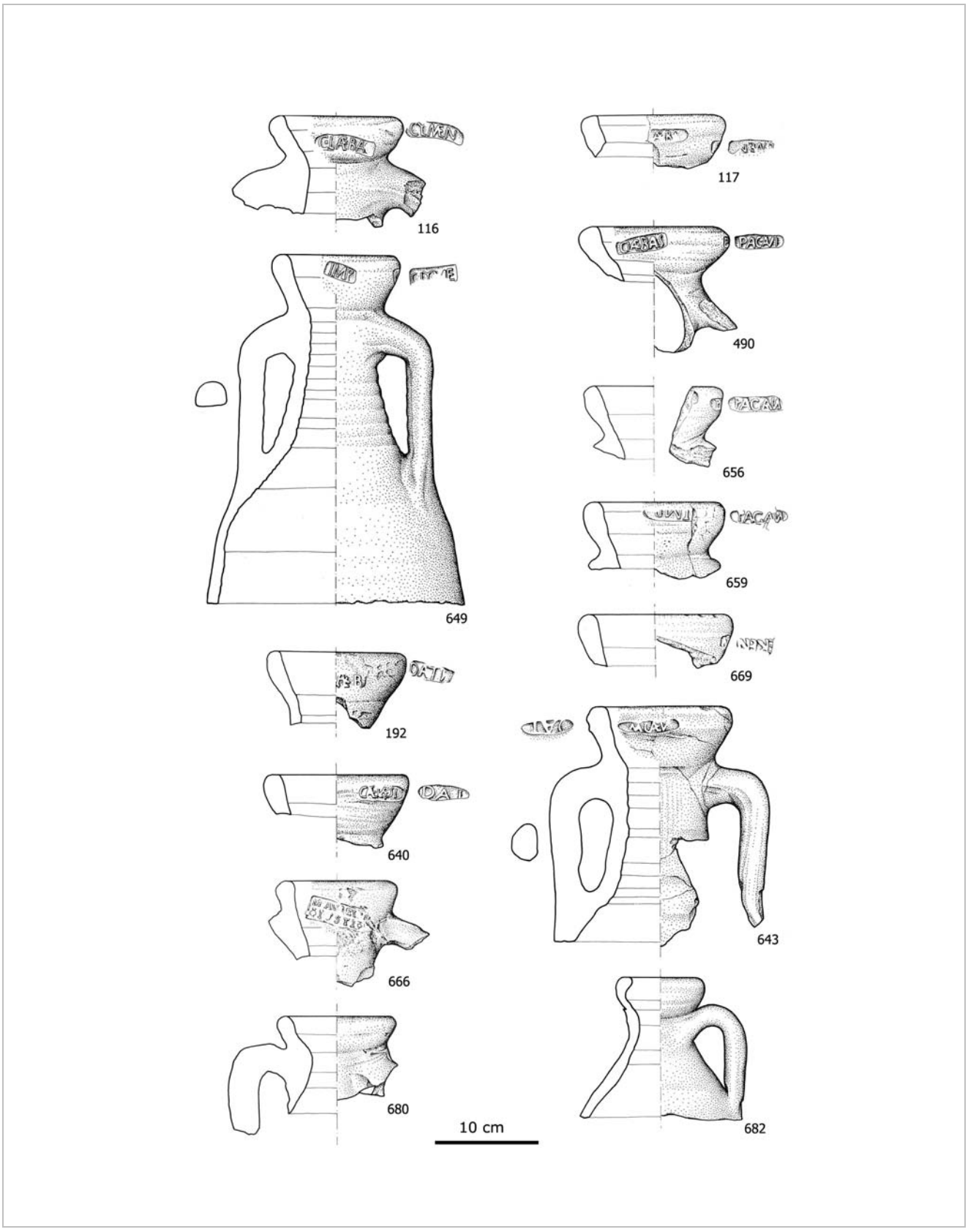

Fig. 2 Images of Dressel 6B type amphorae and the two stamps: 116, 117, 649, 490, 192, 656, 640, 659, 669, 643, Fažana 1 Type: 666, 680, Fažana 2 type: 682 (Bezeczky 1998, Catalogue numbers correspond with heavy mineral sample numbers). Scale 1:4

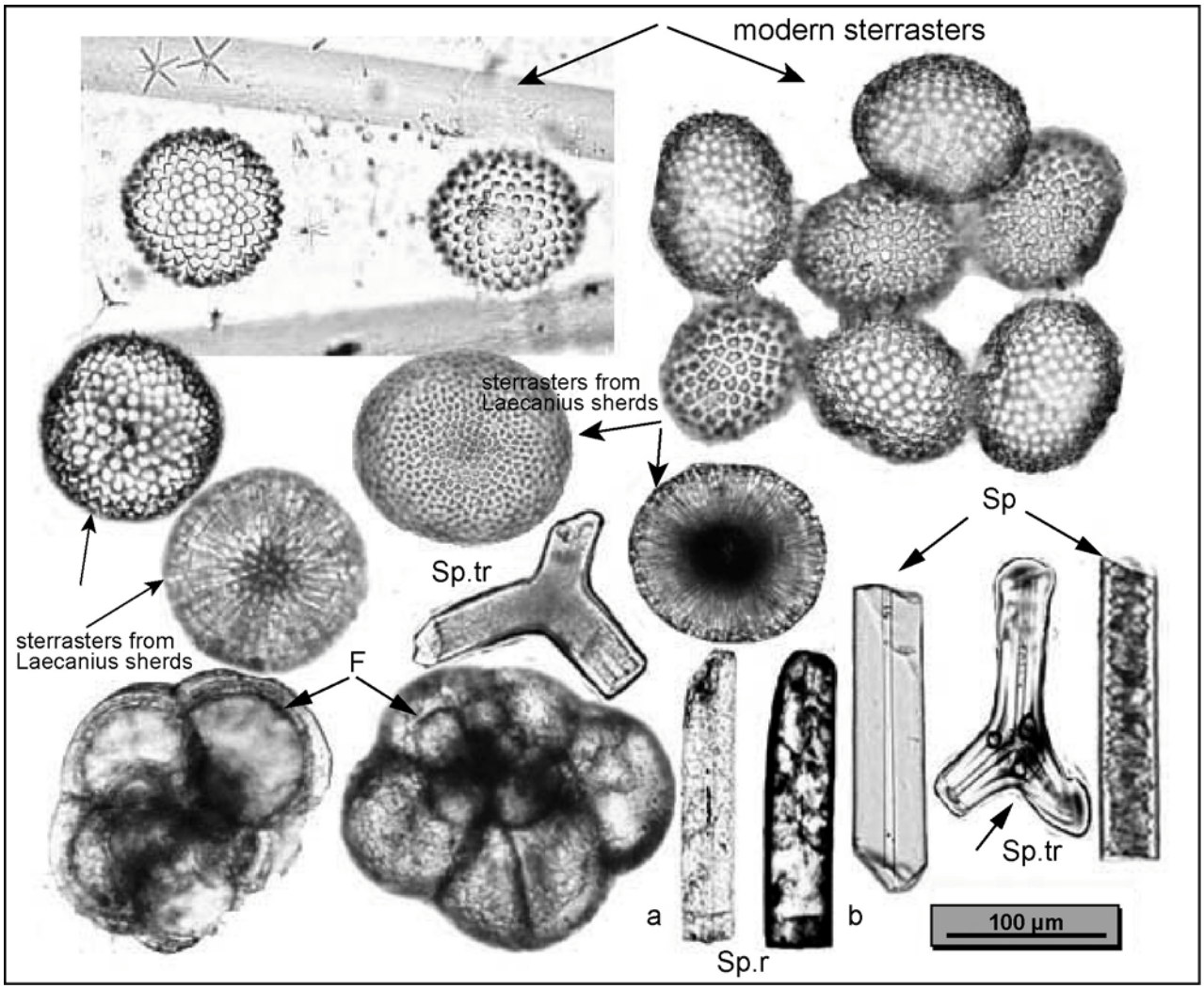

Fig. 3 Sponge spicules and planktonic foraminifers from Laecanius amphorae sherds. Top row, sterrasters from Geodia sp., Belize for comparison with Geodia sponge spicules (sterrasters) from Laecanius sherds (second row). F: planktonic foraminifers; Sp.tr: trilete spicules; Sp: mono spicules; Sp.r recrystallised fossil sponge spicule, (a) plane polarized light, (b) crossed polars.

Lithic fragments, detected in a few sherds, include micaschists, phyllite, sandstone and, very rarely, volcanic particles. Almost every amphora sherd contains ground up carbonate fragments, mostly sparry or micritic carbonate from tempering the clay with limestone. In thin section, these fragments are readily distinguished by their conspicuously large size. There were also microfossils embedded in the groundmass, including foraminifers, various shell fragments, and siliceous sponge spicules. Sherds from amphorae fired at high temperature have a glassy groundmass with secondary calcite crystals (*Mange & Bezeczky 2006; 2007*).

Heavy mineral analysis was carried out on the 45-210 µm size fraction, using the standard preparation technique by *Mange & Maurer (1992)*. The amphora sherds contain diverse, well-preserved heavy mineral suites enriched in epidote-group minerals and garnet. Zircon, tourmaline, and brown hornblende are present in moderately high proportions. Apatite, rutile and sphene are fairly common. Other species, occurring frequently but in low number, include green and brown spinel, several amphibole varieties, pyroxenes, staurolite, kyanite and, rarely, anatase, brookite, allanite, corundum, blue sodic amphibole, serpentine and sillimanite. Of the mica group, biotite is the most common, chlorite was occasionally found in small amounts and white mica is rare.

In order to augment information from heavy mineral and thin section data, the loose light fractions were mounted in clove oil and inspected under the polarising microscope. This allows observation of a larger bulk of

material, and rolling the particles in the clove oil facilitates a 3D view of grain morphology. The chance of finding identifiable microfauna is also enhanced. Faunal remains are embryonic planktonic foraminifers and a variety of sponge spicules (**Fig. 3**). Heavy mineral signatures in amphorae produced in other workshops facilitated their differentiation from the Laecanius amphorae. Comparative heavy mineral analysis of terra rossa from the vicinity of the workshop indicated that terra rossa was the major source for the paste. Differences observed in the heavy mineral composition of the amphorae and terra rossa were interpreted by the polygenetic nature and spatial heterogeneity of the latter, and the mixing of the paste with sandy temper. Modern Adriatic sponge spicules [sterrasters of the modern sponge Geodia cydonium (Jam.)] in the majority of Laecanius amphorae (**Fig. 3**) along with the temper-derived, generally immature, heavy mineral assemblages suggest that the clastic temper was obtained from the sandy deposits of the Adriatic (*Mange & Bezeczky 2006, 2007*).

THE SECOND PERIOD OF THE WORKSHOP

From the Flavian to the Hadrianic period, i.e., from AD 78 to 138, the production of the amphorae appeared with the Emperor's stamp, after the Laecanius family died out. This was confirmed by the amphorae (**Fig. 2**) on which the name of the vilici - Clymenus, Paganus, Datius - occurs together with the name of the imperial owner (dominus). It seems quite certain that the three vilici witnessed the change of the ownership (*Baldacci 1967-1968; Tassaux 1982; Bezeczky 2001*). Pliny the Elder (NH 26.5) mentions that the younger Laecanius suddenly died in 77/78. Perhaps the older Laecanius died before or after the tragedy of his son. Both the property and the workshop were taken over by the Emperor Vespasian and were integrated into res privata (imperial estates).

Although the ownership of the figlina changed in the second period, the classic Dressel 6B form was not changed. Production was continuous under Vespasian, Titus, Domitian, Nerva, Traian and Hadrian. However, only a few stamps are known. After the reign of Hadrian (in the first quarter of the 2nd century), the Dressel 6B amphorae suddenly disappear from their traditional markets.

There was a very brief period during which Vespasian stamped the amphorae with the IMP stamp in the Fažana workshop. Vespasian died in AD 79. Vespasian's son, Emperor Titus used the stamp IMP (eratoris) T(iti) CAE(aris) AVG(usti) and the vilicus BERENT(...) which was identified recently (*Starac 1997; Bezeczky 2001*).

The final chronology of the Laecanius workshop is as follows:

Before AD 78 – C. Laecanius Bassus:
C.LAEK.BAS and CLYMEN; C.LAEK BAS and PAGANI; LAEK.B and DATI
AD 78 to 24 June 79 – Imperator Vespasian:
IMP and CLYMEN/CLYME; IMP and PAGANI; IMP CAES VESP and DAT
From AD 25 June 79 to 13 September 81 – Imperator Titus:
IMP T CAE AVG and BERENT

Petrology

Fabric analysis results: The amphora sherds have the characteristics of types A and B. Macroscopically observed dominant white inclusions are probably quartz and white mica, while the few very pale, white, angular to rounded inclusions may be limestone fragments. Reddish-brown inclusions, microfossils and shells are also present. Thin section analysis revealed clastic particles which include monocrystalline quartz, polycrystalline quartz, low quantities of potassium-feldspar and iron oxide. Micas are biotite and fine flakes of white mica. Almost every amphora sherd contains ground up carbonate fragments, mostly sparry or micritic carbonate from tempering the clay with limestone. Microfossils, embedded in the groundmass, include foraminifers, various shell fragments, and siliceous sponge spicules. These amphorae contain diverse heavy minerals with generally high epidote and garnet proportions while zircon is occasionally important (**Fig. 4**).

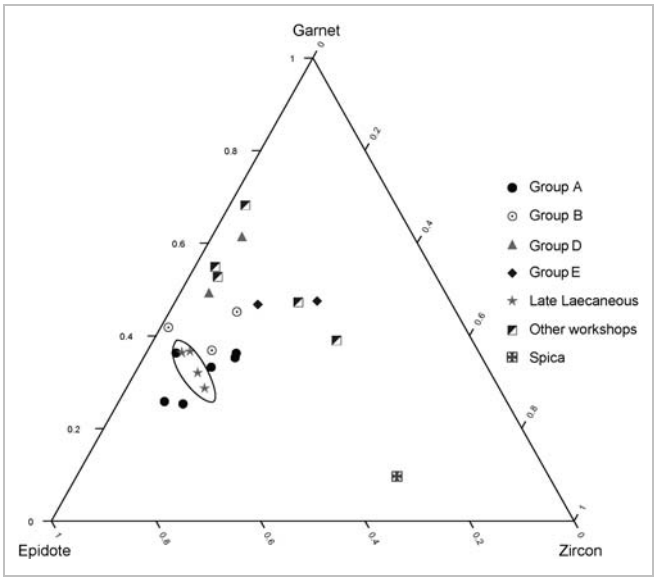

Fig. 4 Ternary plot illustrating the mineralogical relationship of the heavy mineral groups. Note correspondence of late Laecanius data with those of Group A.

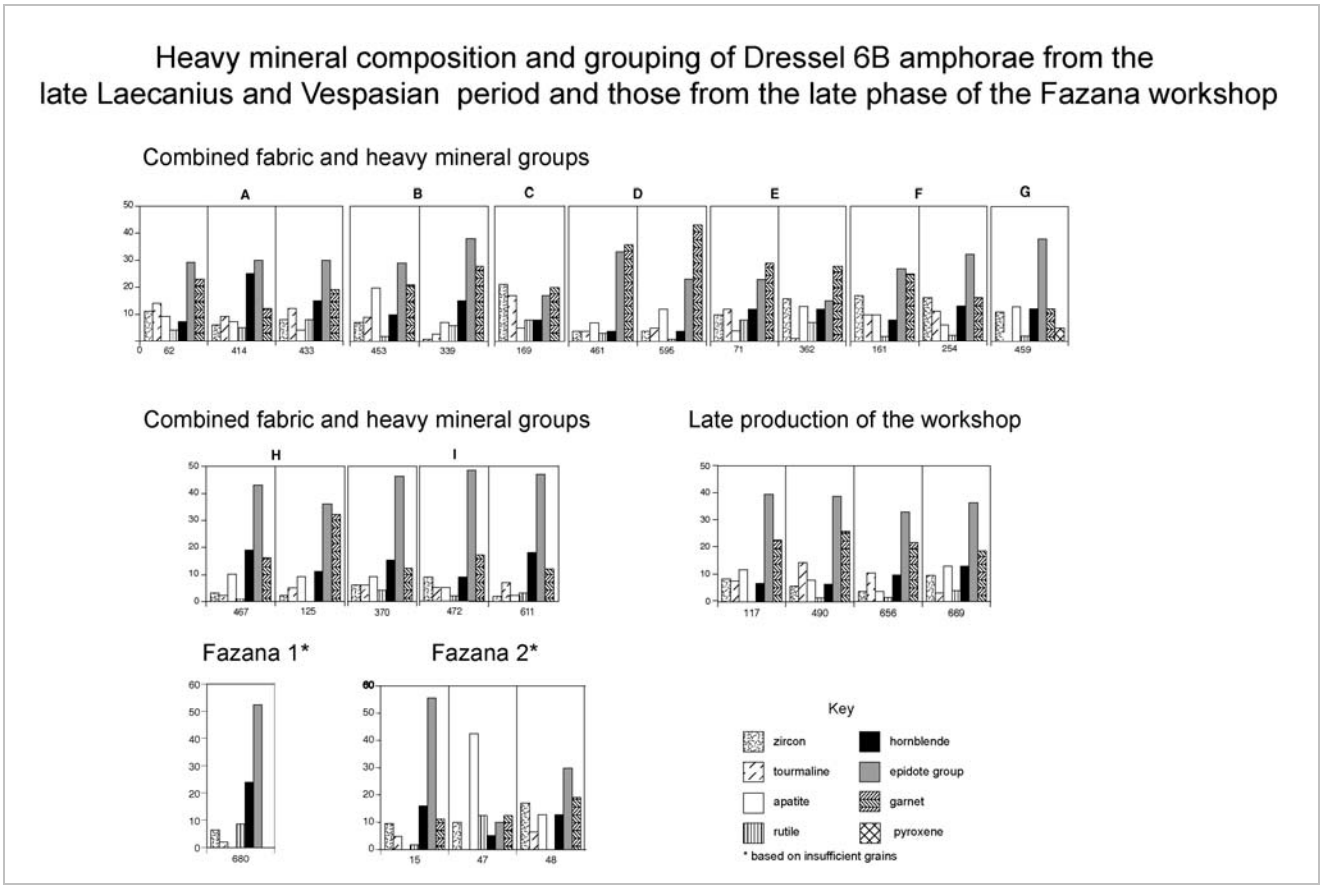

Fig. 5 Heavy mineral composition and grouping of Dressel 6B amphorae from the late Lacanius and Vespasian period and those from the late phase of the Fažana workshop

Similarly to sherds from the earlier period the garnet/epidote/zircon ratios showed systematic variations which coincided with similar variations in fabric characteristics (**Fig. 5**).

THIRD PERIOD OF THE WORKSHOP

We know next to nothing about the Fažana workshop after the first quarter to the second part of the second century AD. Only one amphora stamp, Marcus Aurelius Iustus was found. The only known stamp of the third period is very different from the stamps of the Laecanian and Emperors amphorae (*Bezeczky 1998*).

During the third period of the figlina, amphorae produced in the workshop were different from the classic Dressel 6B form and the whole amphora is more roughly finished. While it seemed initially that these amphorae could be the latest variations of the 6B form, we suggest that they should be recognised as a different type of its own, and can be defined as Fažana 1 (*Bezeczky 1998*).

Petrology

Fabric analysis results: The Fažana 1 amphorae have the characteristics of fabric type A. Thin section analysis indicates varying quantities of carbonate and mica. There are also fossils and siliceous sponge spicules, similar to those of the fabrics in the Dressel 6B amphorae. The quantity of epidote, zircon and hornblende is still significant when compared with that of the other heavy minerals. Garnet and apatite are absent. The number of heavy mineral species is lower than in the Dressel 6B amphorae (**Fig. 5**). The clay was probably obtained from a different source or different beds of the clay succession.

SMALL AMPHORAE FROM THE WORKSHOP WITHOUT CHRONOLOGY

The rescue-excavation of 1990-1991 unearthed rim and handle fragments which belonged to very small amphorae, a type that can be called Fažana 2 (*Bezeczky 1998*). However, the complete amphora cannot be reconstructed until more pieces are found.

Petrology

Fabric analysis results: The surface of the Fažana 2 small amphorae is varied. Some of the amphorae have few components with occasional red iron oxide pieces and gastropod shells. Other amphorae have small white limestone pieces, voids, reddish-brown inclusions, and microfossils and shell fragments. Thin section analysis shows varying quantities of carbonate. In addition to the fossils, the amount of iron oxide is considerable. In the heavy mineral fractions epidote, garnet, hornblende and zircon are generally abundant while the proportions of apatite, tourmaline and rutile vary from sample to sample (**Fig. 5**).

SUMMARY

Nine different fabric types can be distinguished amongst the Laecanius amphorae manufactured during the first phase of the Fažana workshop. Differences both in the groundmass and in clast-content can be detected under the microscope even in amphorae marked with the same vilicus stamps. It is possible that such amphorae were produced in different years with the raw material coming from a different bed of the same clay outcrop or from another location. Petrography showed that quartz is the dominant clastic component while carbonate is common as temper. The amphora samples contain diverse heavy minerals with generally high epidote and garnet proportions; zircon is occasionally important. Heavy mineral signatures in amphorae produced in other workshops facilitated their differentiation from the Laecanius sherds. Modern Adriatic sponge spicules in the majority of Laecanius sherds along with the temper-derived, generally immature, heavy mineral assemblages suggest that the clastic temper was obtained from the, readily available, sandy deposits of the Adriatic.

No particular changes were observed in the amphorae during the second phase of the workshop when amphorae were marked by the stamps of the emperor. Characteristics of the fabric are, in most cases, similar to those made during the first phase.

Production was stopped during emperor Hadrian (AD 117-138). However, when it was resumed after a few decades, Fažana produced amphorae with different shapes. The petrological analysis shows slight differences, but this cannot prove changes in production technology. It seems likely, however, that new clay beds were exploited. The characters of the small amphorae are similar to those manufactured during the first two phases and only few show changes in their fabric.

Archaeological and petrological analyses of Laecanius amphorae from the first phase of the Fažana workshop, published earlier, complemented by our current report on the second (imperial amphorae) and third phase, provide an insight into the petrological character of one of the largest amphora workshops in southern Istria. This integrated analysis enabled differentiation of the Laecanius amphorae from those produced in central Istria and from products of other workshops in northern Italy. For example, all samples from the other workshops contain varying proportions of quartz and some feldspars. The Northern Italian (with Costini stamp) is quartz-rich with common potash feldspar, many fine botryoidal pyrites, formed probably as foraminifera-infill, and relatively abundant planktonic foraminifers. It is important to note that, compared with many contemporary microfauna in the Laecanius amphorae, these are all fossil forms and the shells are recrystallised. Another sherd (with Apici stamp) is also rich in quartz. Two other samples (with Vari Pacci stamps) are coarse-grained but have low amounts of quartz. Few botryoidal pyrites were detected, but no microfauna. The amount of clastic particles in the Loron, Mid-Istrian (with Calvia Crispinilla stamp) sherd are low, they are very fine and microfauna was not encountered. Heavy mineral signatures of Laecanius sherds and those of other workshops are clearly different.

Through a comprehensive study of the products of the Fažana workshop we have gained a better understanding of management and working practices of an important Roman pottery workshop throughout its existence. A continuous supply of raw material was essential for producing abundant amphorae. Our research has revealed that the source of both the clay and temper was available locally, that resulted in their easy transportation. Such favourable conditions, augmented by excellent organisation, resulted in the continuous production of large number of amphorae for a long duration, despite changes in ownership and vilici. The demand for such a high amount of amphorae implies that the estates had a thriving olive production.

REFERENCES

ALFÖLDY, G. (1982): "Senatoren aus Norditalien Regiones IX, X und XI", in: Epigrafia e ordine senatorio, II. TITVLI 5. Roma, 309-368.

BALDACCI, P. (1967-1968): "Alcuni aspetti dei commerci nei territori cisalpini", in: Atti del Centro Studi e Documentazione sull'Italia Romana, I. 7-50, Milano - Varese.

BEZECZKY, T. (1994): Amphorenfunde vom Magdalensberg und aus Pannonien, Ein Vergleich, Archaologische Forschungen zu den Grabungen auf dem Magdalensberg 12, Klagenfurt. Mit einem mineralogisch petrographischen Beitrag von S. Józsa, R. Sauer, G. Szakmány und T. Weiszburg.

BEZECZKY, T. & PAVLETIĆ, M. (1996): "New objects from the figlina of C. Laecanius Bassus", Jahreshefte des Öst. Arch. Inst., 65, 143-163.

BEZECZKY, T. (1998): The Laecanius Amphora Stamps and the Villas of Brijuni. Österreichische Akademie der Wissenschaften, Philosophische-Historische Klasse Denkschriften, 261: Wien.

BEZECZKY, T. (2001): The chronology of the end of the Laecanius workshop, in: Carinthia Romana und die Römische Welt, Festschrift für Gernot Piccottini zum 60. Geburtstag, Klagenfurt, 2001, 421-424.

BEZECZKY, T. (2004): Stamps, Inscriptions and Amphorae from Northern Italy, in: Epigrafia Anforica, J. Remesal Rodríguez (eds.), II. Col-Lecció: Instrumenta (Universitat de Barcelona) 17, 2004, Barcelona, 289-305.

CARRE, M.B. (1985): Les amphores de la Cisalpine et de l'Adriatique au début de l'empire. Mélanges de L´école Française de Rome Antiquité, 97, 1985-1, 207-245.

CIPRIANO, S. & FERRARINI, F. (2001): Le anfore romane di Opitergium, Cornuda TV.

GNIRS, A. (1908): "Istrische Beispiele für Formen der antik-römischen villa rustica", Jahrbuch für Altertumskunde 2, 124-143.

GNIRS, A. (1910): "Eine Römische Tonwarenfabrik in Fasana bei Pola", Jahrbuch für Altertumskunde 4, 79-88.

GNIRS, A. (1910a): "Forschungsergebnisse aus dem südlichen Istrien", Jahreshefte des Öst. Arch. Inst. 13, Beibl. 95-106.

GNIRS, A. (1911): "Grabungen und Untersuchungen in der Polesana", Jahreshefte des Öst. Arch. Inst. 14, 5-46.

GNIRS, A. (1914): "Forschungen in Pola und in der Polesana", Jahreshefte des Öst. Arch. Inst. 17, Beibl. 161-184.

GNIRS, A. (1915): "Forschungen über antiken Villenbau in Süsistrien", Jahreshefte des Öst. Arch. Inst. 18, Beibl. 99-164.

JÓZSA, S., SAUER, R., SZAKMÁNY, Gy. & WEISZBURG. T. (1994): Mineralogisch petrografische Untersuchungen. In: Bezeczky 1994, Amphorenfunde vom Magdalensberg und aus Pannonien, Ein Vergleich, Archaologische Forschungen zu den Grabungen auf dem Magdalensberg 12, Klagenfurt. 1994, pp. 143-195.

MANGE, M.A. & BEZECZKY, T. (2006): Petrography and provenance of Laecanius amphorae from Istria, Northern Adriatic region, Croatia. Geoarchaeology: An International Journal 21, 427–458.

MANGE, M.A. & BEZECZKY, T. (2007): The provenance of paste and temper in Roman amphorae from the Istrian Peninsula, Croatia. In: Mange, M., Wright, D.T. EDITORS, Heavy Minerals in Use. Developments in Sedimentology Vol. 58. Elsevier, 1007-1033.

MANGE, M.A. & MAURER, H.F.W. (1992): Heavy Minerals in Colour. London: Chapman & Hall.

MATIJAŠIĆ, R. (1982): "Roman Rural Arcchitecture in the Territory of Colonia Iulia Pola", American Journal of Archaeology, 53-64.

PESAVENTO MATTIOLI, S., CIPRIANO, S., PASTORE, P. & MAZZOCCHIN, S. (1992): Anfore romane a Padova: ritrovamenti dalla città, Materiali d'archeologia 1, a cura di S. Pesavento Mattioli, Modena.

PIR2: Groag, E., Stein, A. & Petersen, L. (eds.) (1933): Prosopographia Imperii Romani, Berlin.

STARAC, A. (1997): "Napomene o amforama Dressel 6B (Osservazioni sulle anfore di tipo Dressel 6B", Hrvatško Arceološko Društvo, 18, 143-161.

TASSAUX, F. (1982): "Laecanii, Recherches sur une famille sénatoriale d'Istrie", MEFRA 94, 227-269.

ZACCARIA, C. (1989): "Per una prosopografia dei personaggi menzionati sui bolli delle anfore romane, dell'Italia nordorientale", in: Amphores romaines et histoire économique dix ans de recherche, Coll. de L'École Française de Rome, 114, 469-488.