

RURAL, URBAN AND SUBURBAN COMMUNITIES AND THEIR ECONOMIC INTERCONNECTIVITY IN COASTAL NORTH ETRURIA (2ND CENTURY BC - 2ND CENTURY AD)

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I. *Introduction*¹

In coastal north Etruria (Luni, Lucca, Pisa, Volterra and their territories; Fig. 1) the authors of this chapter are currently conducting an intensive ‘total archaeology’ research project² into long-term developments from the Late Bronze Age to the early medieval period, with a focus on the late Etruscan, early/middle Roman and late Roman periods.³ The work is still in progress; this chapter presents some results, a few tesserae of a larger mosaic. In particular, it zooms in on the Pisa-Volterra district and on the impact of the Roman conquest on regional economic developments from the 3rd century BC onwards. More precisely, it attempts to establish the nature, the socio-economic effects and the dynamics of cultural change of this process in its urban and wider territorial context, presenting the processed data in chronological order.

<< Fig. 1. The study area.>>

From the 6th to the early 2nd century BC two cities, Pisa (Pisae) and Volterra (Velathri, Volaterrae) dominated north-west Etruria. Their territories extended along the coast from the river Magra to the river Fine and from the Fine to Bolgheri respectively and both also encompassed large sections of the hinterland. The conflict with Rome entered a crucial phase in 298 BC when the Volaterrani and the Falisci were defeated near Volterra.⁴ In 283 BC Rome definitively overcame the Etruscan peoples near Lake Vadimone. Shortly afterwards Volterra presumably signed a treaty (*foedus*) with Rome. Around the same time Pisa became a *civitas foederata*; in the 2nd century BC, during the wars against the Ligures,⁵ it was a Roman military base. In 252/241 BC the coastal road Aurelia Vetus was constructed, initially linking Rome with Cosa and subsequently extended northward in stages.⁶ With the foundation of two new towns in the context of the Ligurian wars in the 2nd century BC the urban system of north-west Etruria changed. In 180 BC Pisa handed over part of its northern territory for the foundation of the Latin colony of Luca (Lucca), and in 177 BC, after the final defeat of the Ligures in north-west Tuscany, the Roman colony

¹ While the authors jointly discussed the paper’s contents, sections 1-3 were written by Marinella Pasquinucci and 4-6 by Simonetta Menchelli.

² Darvill (2001, 36).

³ See Pasquinucci and Menchelli (1999 and 2012).

⁴ Livy, 10.12

⁵ Segenni (2011).

⁶ Coarelli (1988); Pasquinucci and Ceccarelli Lemut (1991).

of Luna (Luni) was established.⁷ Between 42 BC (the Battle of Philippi) and 31 BC (the Battle of Actium) or slightly later, most cities and plains in north Etruria were remodelled in the course of resettlement projects for Roman veterans.⁸ The late-Republican colonization of the area had a great impact on the coastal environment. From the 2nd-1st century BC up to c. AD 1830 the coastline progressed westwards, mostly in tandem with the Arno delta, due to a marked increase in alluvial sedimentation caused by anthropogenic factors (deforestation, increased agricultural and manufacturing activities). These factors were linked to the establishment and subsequent territorial remodelling (centuriation, allotments) of Republican colonies in the early 2nd century BC (Luca/Lucca and Luna/Luni) and Triumviral/Augustan colonies in the late 1st century BC (Luni, Lucca, Pisa, Volterra, Firenze, Arezzo).⁹

II. *The Roman conquest and infrastructural organization*

Pisae is well known to have played a fundamental strategic role in the late 3rd century BC in the wars against the Ligures, both as *civitas foederata* and as the main Roman naval base. During the military actions in 203 BC, when the consular *provincia* 'Etruria ac Ligures' was established,¹⁰ Pisae again served as the main base.¹¹ In the same period Volaterrae was an ally of Rome and supplied Publius Scipio with '*interamenta navium et frumentum*'.¹² In short, the Romanization process¹³ was well underway in this district. In these years the coasts of north Etruria were a national frontier and therefore, in the words of Hopkins, 'a tax consuming region'. The Roman state sent food and financial support to the border areas to supply the army and to build the infrastructural network (roads, bridges, ports, waterways) necessary for effective control.¹⁴ The organization of the Pisa-Volterra road and port system is well documented by archaeological, literary and epigraphic sources. The main roads were the Via Aurelia Vetus/Nova and the Via Aemilia (named after the most prominent Roman *gentes* involved in the Romanization of Etruria), built in the period 252-109 BC (Fig. 2).¹⁵ The modern SS1 (Aurelia) roughly corresponds to the ancient road, which ran along the coast, linking the main harbours (Vada Volaterrana, Portus Pisanus and Luna) and the minor ports that were often located near river mouths. In the route Vada Volaterrana-Pisae, the Via Aemilia followed the foothills in the Tora river valley, a rural area with villas and farmsteads. Its route was marked by a large *mansio* (Torretta Vecchia) and a few milestones. Numerous

⁷ Coarelli (1988); Ciampoltrini (2004a).

⁸ Ciampoltrini (1981); Keppie (1983).

⁹ Pasquinucci et al. (2001).

¹⁰ Livy 30.1.2.

¹¹ Segenni (2011). For the military campaigns see Ciampoltrini (2004a, 306-7).

¹² Livy 28.45.15.

¹³ A large volume of publications exists on this topic. The most recent works include Revell (2009); Morley (2010); Mattingly (2011); Millett (2012).

¹⁴ Hopkins (1980, 101-25). For the needs of war, see also Erdkamp (2007, 101-8).

¹⁵ See Note 6. Fabiani (2006) effectively summarises the extensive bibliography on these two roads. On the Aemili, see Rossignani (1995); on the Aurelij/Valerii, see Dallai *et al.* (2006).

tombs and necropolises have been identified along these roads, dating back to late antiquity.¹⁶ The Via Quinctia was another important road built in the 2nd century BC; it linked the interior of Etruria with Pisae and its ports, running along the left bank of the ancient course of the Arno.¹⁷ Likewise, an efficient port system became established. In the 3rd-2nd century BC Portus Pisanus and other ports (Isola di Migliarino, S.Piero a Grado, Castiglioncello, Vada) increased their import and redistribution activities,¹⁸ and after the defeat of the *Ligures Apuani*, Luna was founded on a strategic harbour site.¹⁹ Based on the available evidence, it is difficult to establish whether roads and ports stimulated growth and the integration of communities or rather the reverse: that their appearance is a reflection of these processes.²⁰ In our study area, at least, all processes appear to have been at work simultaneously.

<< Fig. 2. Hypothetical routes of the main Roman roads in the study area (after Pasquinucci and Ceccarelli Lemut (1991))>>

In the next section a tentative explanation will be offered for the transformation of the district after it entered the Roman global economic system, involving a dense fabric of developments in agricultural and industrial production, infrastructure and the conglomeration of regional markets.²¹

III. *Economic development in the 3rd to 2nd century BC*

In the 3rd-2nd century BC Pisae, Volaterrae and their respective territories appear to have been flourishing. This prosperity was based on agriculture (as will be argued below, cereals and grapes were the main crops), cattle breeding,²² and commercial and industrial enterprises including shipyards,²³ stone quarries,²⁴ and workplaces for ceramic, stone and alabaster items. Volaterrae in particular, whose aristocracy enjoyed a

¹⁶ See Note 6 and Pasquinucci and Menchelli (2012).

¹⁷ Pasquinucci and Ceccarelli Lemut (1991); Mosca (1992).

¹⁸ Pasquinucci and Menchelli (2010). For the urban port identified in the Pisa-San Rossore area, see Camilli et al. (2006).

¹⁹ De Marinis and Spadea (2004).

²⁰ See Witcher (this volume) and De Haas (this volume).

²¹ Moreover, Woods' 'Global countryside model' as presented by Witcher (this volume) is particularly useful for our narrative as it deals with many topics discussed in our paper, "highlighting the interaction of local and global actors, and of human and non-human actors to produce new hybrid forms and relations" (Woods (2007, 485)).

²² Livy 35.3 (on the *ager Pisanus*): *vis magna pecorum*. Moreover, loom weights are scattered throughout the rural settlements.

²³ Strabo 5.2.5 writing about Pisae and drawing on Posidonius (Lasserre (1967, 202)).

²⁴ The hill/mountain areas (Monti Pisani, Monti Livornesi) supplied building stone. In his description of Pisae Strabo (5.2.5), once again drawing on Posidonius, mentions the quarries at Monte Pisano. The same stone was later used for part of the medieval city walls.

privileged relationship with Rome,²⁵ boasted a thriving artisanal production that included cinerary urns²⁶ and black gloss ware, which enjoyed remarkable commercial success.²⁷ Although to date no kilns for the production of black gloss ware have been identified, many scholars believe that the main workshops were located in the urban/suburban areas of the town,²⁸ while in the 2nd century BC black gloss ware was also produced in the countryside (Montaione; see below). This is a significant example of the integration of urban/suburban and rural economies in one manufacturing process.

In many Italian towns urban black gloss ware kilns were located in peripheral/suburban areas, close to the city walls and gates, in order to limit both the risk and the inconvenience of smoke and fire, and to facilitate the supply of raw materials.²⁹ That is probably where also the Volterra workshops were to be found, as is documented for medieval and renaissance pottery kilns,³⁰ which clustered on the slopes above the Cecina valley.³¹

As usual in Roman pottery production, the process involved an elite who owned the land, sources of raw materials (clay, water, firewood), facilities (workshops, drying sheds, kilns), and craftspersons with the necessary skills to work clay, to model and decorate the vessels, and to control the firing process. The absence of stamps on Volterra black gloss ware is significant. The lack of stamps can be explained by assuming a 'centralized' model of production by the city or by a few members of the aristocracy. This 'monopolistic system' obviated the need for stamps to mark individual products.³² Regarding rural black gloss ware there is archaeological and archaeometric evidence of a Volterra lower-quality pottery, which supplied the local market.³³ Most likely it was produced in small kilns scattered throughout the Volterra territory from the coastal plain to the interior, but so far the only production site discovered is the one near Montaione, in the valley of the river Egola.³⁴ Here, a production centre with at least three small kilns has been identified. It is not clear whether this was an isolated rural site or whether it belonged to a nearby settlement that yet remains to be identified. In north Etruria similar situations have been documented at various sites in the territory of

²⁵ Castiglioni and Pizzigatti (1997, 28).

²⁶ Maggiani ed. (1985); Nielsen (1988).

²⁷ Cibecchini and Principal (2004); Cibecchini (2011).

²⁸ Di Giuseppe (2012) summarized the debate on the topic.

²⁹ Di Giuseppe (2012, 80).

³⁰ Pasquinelli (1987).

³¹ Menchelli, Pasquinucci and Picci (2013). On this topic, see also Peña (2013b and this volume).

³² For the opposite model, one based on a nucleated system, which required the use of stamps, see Fülle (1997). See Notes 94-112 for the production of terra sigillata.

³³ Pasquinucci et al. (1998); Menchelli, Pasquinucci and Picci (2013).

³⁴ Bartali and Ugolini (2007).

Clusium,³⁵ particularly at Marcianella where a large rural pottery production centre was excavated that was probably linked to the town of Clusium.³⁶

Returning to the urban black gloss ware, H. di Giuseppe³⁷ demonstrated that the Volterra manufacturing tradition displayed a high degree of continuity, since “the Etruscan type of the Campana-B circle”³⁸ derived from the relatively high quality Volterrana D.³⁹ This north-Etruscan production passed through the Romanization process whilst maintaining its own identity; in fact, the Romans traded the local black gloss ware within their own economic networks, especially to the northwest⁴⁰ when conquering the Gallic and Iberian coasts.

In addition, the demands of the Roman economy had a considerable impact on north-Etruscan agriculture, in particular the production of wine and the trade in food items. The authors believe that the Graeco-Italic and Dressel 1 amphorae especially represent clear illustrations of a number of social and economic phenomena. In the early stages of the Roman conquest, a large number of Latial-Campanian amphorae reached the north-Etruscan coast.⁴¹ Reflecting a truly global economy, these amphorae not only arrived at the consumption centres of the allied communities but also in the Ligurian oppida in Pisa-Versilia territory, in the middle of the Romano-Ligurian wars. Graeco-Italic wine amphorae have been found at a number of high-altitude settlements on the Alpi Apuane (Monte Piglione: 1,233 m asl; Monte Piglionico: 1,200 m asl)⁴² in association with black gloss ware drinking cups and jugs manufactured in central-Tyrrhenian areas.⁴³ Evidently the Ligures, while facing their long, valiant struggle against the Romans, were still drinking their enemies’ wines and using their vessels (especially *petites estampilles* cups). This import on a massive scale, well documented throughout Pisa-Volterra territory and in ports, urban settings and rural contexts,⁴⁴ bears witness both to an increased local demand for wine and to the participation of this district in the Roman trade, which sent enormous quantities of wine and black gloss ware vessels towards the western Mediterranean.⁴⁵

This is the historical context in which the Roman conquest stimulated the north-Etruscan Graeco-Italic production as early as the mid-3rd century BC. The region appears to have been suitable for grape cultivation from the proto-historical period onwards, as

³⁵ Paolucci (2003, 11-4).

³⁶ It consisted of six kilns, active between the 3rd and - 2nd centuries BC and produced black gloss ware, red slip ware, thin-walled pottery, coarse wares, amphorae and loom weights (Pucci and Mascione (2003)).

³⁷ Di Giuseppe (2012, 138).

³⁸ Cibecchini and Principal (2004, 162).

³⁹ Pasquinucci (1972).

⁴⁰ Bianchini et al. (2000, 10); Cibecchini (2011).

⁴¹ Menchelli et al. (2007).

⁴² Guidi et al. (1987).

⁴³ Paribeni ed. (1990); Ciampoltrini (2004b).

⁴⁴ Menchelli et al. (2007); Camilli et al. (2006).

⁴⁵ Generally, Tchernia (1986) remains of fundamental importance on this subject; see also Cibecchini (2011). For the export of local products see Menchelli et al. (2007; 2013).

palaeobotanical⁴⁶ and archaeological data indicate.⁴⁷ Relevant with regard to subsequent periods is the observation that archaeological⁴⁸ and archaeometric evidence⁴⁹ suggests that Etruscan PY3 and PY4 wine amphorae were produced locally. Clearly the increased demand for wine stimulated by the Romanization process tied in with the district's agricultural potential.

<< Fig. 3. Schematic geological map showing the location of the north-Etruscan workshops. The production sites of sigillata and amphorae mentioned in the text are, for terra sigillata: Nos. 1, 2, 4; for Graeco-Italic amphorae: Nos. 25, 28; for Dressel 1 amphorae: Nos. 7 – 9, 14, 28-29 ; for Dressel 2-4 amphorae: Nos. 6-9, 14, 16-19, 23; 25; 27-30.>>

Regarding the location of the workshops it can be stated that while black gloss ware production was both urban (Volaterrae) and rural (Volaterrae and Pisae territories), that of the Graeco-Italic and Dressel 1 amphorae centred on the ports. Artisanal quarters have been identified in the hinterland of the ports Vada Volaterrana⁵⁰ and Portus Pisanus,⁵¹ as well as in the *ager Lunensis*, in a coastal site today occupied by the town of Massa.⁵² This location near ports was due to the specific demands of production (Fig. 3); it was more convenient for amphora kilns to be situated in the rural hinterland of ports. It is likely that the same land owners, or at least the same *gentes*, controlled the main workshops of both amphorae and black gloss ware, but data on their organization is lacking since these were not stamped. Data on the scale of production is also still insufficient, but it is certain that north-Etruscan black gloss ware and amphorae were both traded throughout the western Mediterranean.⁵³

IV. Late 2nd - 1st centuries BC

The Roman economic strategy is evident mainly in the standardization of amphora shapes and in technical details of the kilns as has been documented at the Cà lo Spelli (*ager Pisanus*) and Massa production centres. Careful excavation revealed that exactly identical kilns had been used,⁵⁴ turning out similar amphorae. The same standardization has been observed at other amphora workshops in areas, which entered the Roman

⁴⁶ Guido et al. (2004, 85).

⁴⁷ Zanini (1997, 103-15).

⁴⁸ Corretti (2003, 359).

⁴⁹ Menchelli et al. (2007).

⁵⁰ Cherubini et al. (2006).

⁵¹ Cherubini et al. (2006); Picchi et al. (2010).

⁵² Fabiani (2012).

⁵³ For black gloss ware, see the references in Notes 48-51. Integrated archaeometric studies indicate that local wine amphorae were traded to Gallia (Thierrin-Michael et al. (2004)).

⁵⁴ They have vault elements of identical type (conical) and dimensions (c. 21 cm long); see Menchelli et al. (2013, fig.5, 6-7).

economic sphere.⁵⁵ This transmission of expertise and technology⁵⁶ is clear evidence of the interaction of local and global agencies, which in turn successfully stimulated integration.

While it is possible to present an overall reconstruction of local manufacturing trends, an assessment of land management issues in the Pisa-Volterra countryside⁵⁷ is problematic. As was stated above, the district was characterized by a mixed farming economy (it still is today), which included cereal cultivation and commercial crops (vineyards, olive trees). Rural settlement patterns based on field survey results did not reveal signs of a demographic crisis in the countryside. On the contrary, in the 2nd-1st century BC small production units prevailed (farmsteads) while villas were rare.⁵⁸ Only one villa, late Augustan in date, has been recorded in the territory of Pisa (Massaciucoli). Epigraphic evidence suggests that its owner was probably a member of the *gens* of the Venuleii Aproniani, who were part of the local elite.⁵⁹

<< Table 1. Settlement trends in a sample area surveyed in the coastal *ager Volaterranus* (After Iacopini et al. 2012).>>

In the Volterra coastal plain the authors have identified seven villas, but surveys carried out further inland by Carandini and Terrenato and by the authors produced no evidence for villas there.⁶⁰ Survey results in the coastal *ager Volaterranus*, between the rivers Fine and Cecina, suggest an increase in the number of rural settlements from the 2nd century BC and peaking in the 1st century AD (Table 1).⁶¹ It seems, therefore, that the elite in the late Republican period and later lived mostly in urban or suburban *domūs* at Pisa, Volaterrae or Rome, while their estates were run by farmers, most likely tenants (*conductores* or *coloni*) from whom the land owners would periodically collect rent, produce or sale proceeds.⁶² Past research has convincingly demonstrated,⁶³ and recent and current research have confirmed, that free labour coexisted in Roman Italy alongside slave labour, and that the small farmer persisted⁶⁴ and even structurally benefitted the villa system. Whatever land management strategies may have been used,

⁵⁵ E.g. the Sella Marina kilns in *Brutium* (Corrado (2009, Fig. 3)).

⁵⁶ Van Oyen (2011) recently discussed the encounter of different pottery production systems and their associated expertise.

⁵⁷ On the central position of agriculture in the ancient economy, see Mattingly and Salmon (2001b, 3-5).

⁵⁸ Pasquinucci and Menchelli (1999).

⁵⁹ Ciampoltrini (1994).

⁶⁰ Terrenato and Saggin (1994); Terrenato (1998); Terrenato (2001b).

⁶¹ Iacopini et al. (2012). Of course the total number of sites is the combined reflection of phenomena of abandonment, construction and re-occupation, etc. There are many more 'farmstead' sites than villas (respectively 44 and 7 in the 1st century BC).

⁶² Aubert (1994, 129-31). On this issue, see Launaro (2011a, 23-5 and this volume).

⁶³ Capogrossi Colognesi (1992-93, 202).

⁶⁴ Lo Cascio (2004). On the persistence of the peasant/soldier, see Rosenstein (2004). On the continued vitality of the Roman peasantry, see Kron (2008a) with references.

a large agricultural surplus was certainly produced in the Pisa-Volterra countryside⁶⁵ since even small farmsteads participated in market exchange - albeit obviously on a reduced scale - as shown by the imported wares collected at many of them.⁶⁶ Presumably there were other important economic enterprises in the district in addition to agriculture and pottery production, in particular shipbuilding⁶⁷ and long-distance trade.⁶⁸

In conclusion, the district appears to have experienced a phase of progressive economic growth in the 2nd and 1st century BC.⁶⁹ The question is who the protagonists of this process were, which involved the local economy in all its agricultural, manufacturing and trade aspects, and in both urban and rural contexts. Who stimulated the local potential and channelled it into a global economic system? Those protagonists were probably the main Roman *gentes* who were involved in the Romanization process in north Etruria (Aemilii and Aurelii/Valerii), as well as members of the local elite (Ateii,⁷⁰ Caecinae,⁷¹ Rasinii⁷²) who were able to gain the respect and protection of the former group. In our opinion, the economic development of the district was rooted in this interconnectivity between Roman and local elite.⁷³ It is highly likely that they all took advantage of the growth that resulted from the conquest and laid the foundation for the subsequent expansive phase, during which these groups instigated many manufacturing activities, as documented by stamps on bricks, tiles and terra sigillata.

V. The early Imperial period

Pisae and shortly afterwards Volaterrae became Roman *coloniae* (respectively *Colonia Opsequens Iulia Pisaa*⁷⁴ and *Colonia Iulia Augusta Volaterrae*).⁷⁵ Their urban plans were

⁶⁵ Evidently, these territories took part in the general production trends, which affected Roman agriculture in the late Republican period, as documented by Kron (this volume).

⁶⁶ Pasquinucci and Menchelli (1999). An increase in the quality and quantity of consumer goods in broad socio-economic strata is generally accepted to be the result of an expanding economy (Harris (2007, 529-33)).

⁶⁷ According to literary and epigraphic sources, the Pisa shipyards (*navalia*) were active from the Republican (see above, Note 29) to the late Roman period (Claudianus, *Bell.Gild.* 483). *Fabri tignarii* and *fabri navales* are mentioned in an early Imperial inscription (CIL XI, 1436) and 'galeioti' (galley builders) are referred to in medieval documents (Garzella (2003a and b)).

⁶⁸ For example, in 46 BC Aulus Caecina was involved in *negotia* in Asia Minor (Cicero, *Epistulae ad Familiares* 6.8.2 and 2.7.5).

⁶⁹ For scholars who, like the authors, maintain that the Roman economy had a variable, but in some phases perceptible, development, see Lo Cascio (2006); Wilson (2009b). Scheidel (2007b and 2009), however, disputes this claim. The issue was the subject of a conference in Leuven, published in *FACTA* 5 (2011); see in particular Poblome, Malfitana and Lund (2011).

⁷⁰ Sangriso (1998).

⁷¹ Pizzigati (1997).

⁷² Sangriso (2006).

⁷³ This could be labelled a 'landscape of opportunity' according to Mattingly's classification for Roman North Africa (Mattingly (2011)).

⁷⁴ Segenni (2011).

improved and embellished with new buildings, canvasses for early Imperial propaganda as documented by archaeological and epigraphic evidence.⁷⁶

The number of settlements in the two towns' respective territories appears to have greatly increased, especially in the Pisa plain, which was subjected to centuriation.⁷⁷ Excavations carried out near Acquarella (Camaione) in the northern *ager Pisanus* partially revealed the remains of a late Republican/early Imperial farmstead with an oil press, which functioned until the late Roman period.⁷⁸

Rural settlements, which also arose in the coastal *ager Volaterranus*, included farmsteads and villas (see Table 1); the results of the excavation of one of these, a villa at S. Vincenzino, were recently published.⁷⁹ Farmsteads in the Pisa-Volterra district appear to have been prosperous, as demonstrated by the presence of column bricks, window panes, and different types of flooring according to the rooms' specific function (*opus spicatum*, *signinum* or quadrangular paving stones).⁸⁰ Most of these farmsteads yielded pottery imported from the entire Mediterranean basin, evidence of their integration into a market-oriented economy. Locally traded surplus undoubtedly consisted mainly of cereals and also wine, as the abundant local production of Dressel 2-4 wine amphorae shows.⁸¹ These products had always characterized the district; significantly, Pliny refers to them in the 1st century AD.⁸²

It was no coincidence that the Pisae sigillata production started (c. 15 BC) at the instigation of Marcus Valerius Volusus, a member of the *gens* Valeria who participated in the Romanization of the district.⁸³ Interestingly, Valerius Volusus sigillata vessels from Pisa are widespread in military and civil contexts; these vessels paved the way for the Ateian sigillata, which became an enormous commercial success a few years later.⁸⁴

⁷⁵ Munzi and Terrenato (1994).

⁷⁶ Pasquinucci (2003); Segenni (2011) for Pisae; Munzi and Terrenato (2000) for Volaterrae; see in general Terrenato (2001b).

⁷⁷ Pasquinucci and Menchelli (1999). See Witcher (2006a) for the complex debate on Etruria. The authors excavated two farmstead sites identified by surveys within the centuriation grid. However - and methodologically interesting - the sites did not produce any Roman stratified structures or objects, only many residual finds in the top soil, which were consistent with a late Republican and late Roman date. At one of the farmsteads, in the east of the *ager Pisanus* (site Le Melorie, Ponsacco) the authors were able to excavate its bricks and also a roof tile kiln, which was well preserved as it had been dug into a deep, thick alluvial level (Pasquinucci et al. (2008)). All buildings at the second farmstead, in the south of the *ager Pisanus* (site Coltano), had been completely destroyed, but below the destruction levels a Bronze Age salt-production settlement was discovered (Pasquinucci and Menchelli (2002)).

⁷⁸ Paribeni (2012, 43-52).

⁷⁹ Donati (2012).

⁸⁰ Pasquinucci and Menchelli (1999).

⁸¹ See below and Fig. 3.

⁸² According to Pliny, the territory of Pisae was famous for its *Pariana uva* (Pliny, *Naturalis Historia* 18, 109), *siligo* and *alica* (Pliny, *Naturalis Historia* 18, 86-87; 18, 109).

⁸³ Gliozzo et al. (2004). The stamped sigillata vessels found in the Cinigiano workshop (Vaccaro, this volume), tentatively suggest industrial activities by the Aurelii in south Etruria. However, the stamp in question, published in OCK (2000, No. 422) and also dating to 15 BC, is generic and could in theory derive from various workshops located in a number of geographical areas.

⁸⁴ Menchelli (2011a).

The Pisa sigillata workshops were located in the northern suburbs and in the northern part of the *ager Pisanus*. Archaeological, archaeometric and epigraphic evidence has led to the identification of an industrial district, which stretched from the periphery of Pisae to the mouth of the river Auser near Isola di Migliarino, where there was an important sigillata workshop and a harbour.⁸⁵ Of all Italian sigillata production centres, the output at Pisa was quantitatively surpassed only by those producing Arretine wares.⁸⁶ The distribution of Pisan products throughout the Roman Empire and beyond⁸⁷ in military contexts and on free markets⁸⁸ symbolises the Roman global economy.

<< Fig. 4a-b The Isola di Migliarino Potters' List, as transcribed by Camodeca (2006):

XII k. Augu(stas) [i.e. 21 July]
Fornax minor one-
rafta
Cretici cat(illi) cccl
Nonian[i] cat(illi) dcccl
Saturn[ini] cat(illi) cccxl
Lu+++ui ? par(opsides) ccc
Coniunc.? ace(tabula) cxc
Thiodori ace(tabula) dc>>

Concerning Pisan sigillata production, some quantitative data can be derived from the potter's list of Isola di Migliarino published by G. Camodeca (Fig. 4a-b).⁸⁹ According to this scholar, 2630 vessels were placed in a single load, in the *fornax minor* of Sex. Murrius Festus, whose 'firm' appears to have worked for 90 years (AD 60-150).⁹⁰ Assuming that at least twelve kiln loads were fired in a year (two every month from April to September),⁹¹ the minimum number of vessels fired in this smaller kiln would amount to c. 31,000 per year. Multiplying this annual production by the ninety years the company was active results in an estimated total figure of c. 3,000,000 vessels. This number is hypothetical, since it is not certain that the kiln maintained the same production rate throughout these years. Bearing in mind, however, that it was only a

⁸⁵ Menchelli et al. (2001).

⁸⁶ OCK (2000, 37, Table II).

⁸⁷ Menchelli (2004; 2011a), with extensive references; Mees (2012).

⁸⁸ Menchelli (1997); Tchernia (2007, 57-64) pointed out the close connection between private and state-controlled trade.

⁸⁹ Camodeca (2006).

⁹⁰ OCK (2000, no. 1212). So far only 306 stamped vessels by this company have been documented in Mediterranean trade contexts.

⁹¹ Marichal (1981) in his calculations for the Graufesenque production assumes a maximum of 16 kiln loads a year.

smaller kiln owned by one of fifty-two sigillata potters⁹² working in Pisa and its territory for over a century, it is a good indication of the vast scale of the district's production.⁹³

In the light of this massive volume and widespread production of sigillata, the interconnectivity of rural/suburban and urban economies in the district is evident. Sigillata workshops could be found both in the Pisa *suburbium* and in the north of the *ager Pisanus*, and the profits they raised must have benefitted the economy of Pisa, where most of the owners and managers probably lived. Their names were stamped on the vessels; the most famous 'firms' were owned by *gentes* (Ateii, Rasinii, Murrii, Nonii, etc.), who belonged to the local elite.⁹⁴ They connected the rural, suburban and urban contexts by exploiting the agricultural potential and the natural resources (wood and water, and obviously clay for kilns), but also by sharing the same unskilled labour force. The vast number of workers employed in the sigillata production could also be deployed in other agricultural, commercial or manufacturing enterprises according to seasonal demand.⁹⁵

The local production of Dressel 2-4 amphorae illustrates the close integration of agricultural and ceramic production. A number of manufacturing centres in the hinterland of Portus Pisanus and Vada Volaterrana catered to the Pisa and Volterra farmsteads and villas that produced a wine surplus. These amphorae supplied the local market and were also traded westwards, but since they were rarely stamped and can therefore not easily be identified, the available data probably underestimate the extent and importance of their circulation.⁹⁶ The same production areas also turned out bricks and tiles stamped by members of the Pisa-Volterra aristocracy, often the same *gentes* as those who were involved in the production of terra sigillata. These bricks and tiles were used locally in villas and in sponsored public building projects,⁹⁷ but they also circulated in the north-Tyrrhenian commercial networks.⁹⁸

If terra sigillata and stamps on bricks and tiles yield information on the names of workshop owners who belonged to the north-Etruscan ruling class (Valerii, Ateii, Rasinii, Venuleii, Caecinae, Nonii, and so on), only sparse data are available for the Dressel 2-4 amphora production.⁹⁹ A few large villas near the Dressel 2-4 amphora

⁹² Their stamps are reordered in OCK. (2000). This publication mentions another 46 sigillata potters who presumably also worked in the Pisa district.

⁹³ Vernhet (1994) presented comparable calculations for the Gallic sigillata produced at La Graufesenque: an annual minimum of 15 million vessels which, multiplied by the 40 years of manufacturing activities, results in a minimum of 600 million vessels.

⁹⁴ Menchelli et al. (2001). On the multi-faceted organization of Italian (and specifically those at Pisa) sigillata workshops, see Fulle (1997); Kenrick (2004).

⁹⁵ On this topic, see Jacob and Leredde (1982). In the early Imperial period a master could redeploy his human property to other activities, as is documented by many legal sources (Bodel (2011, 230, Note 30)). Seasonal immigration, also long-distance, is documented by literary sources; see e.g. the case of Vespasian's great-grandfather (Suetonius *Vesp.* 1.4).

⁹⁶ Menchelli et al. (2007). They were traded to the territories of the Helvetii and Rauraci; see Thierrin-Michael et al. (2004); Martin-Kilcher et al. (2013, 393). See Genovesi (2012, 550-8) for the stamp FELIX.

⁹⁷ See above, Notes 82 and 70 on the Caecinae and the Venulei Aproniani respectively.

⁹⁸ Menchelli (2003); Gliozzo et al. (2004); Dallai et al. (2006).

⁹⁹ See Note 96.

workshops in the hinterland of the Vada Volaterrana hint at a close connection between the agricultural and manufacturing interests of the local ruling class.¹⁰⁰ A number of necropolises that have been identified in this manufacturing district¹⁰¹ mainly contained poor graves and are a potential source of information on the settlement system. This system consisted of *casae* and *tuguria* scattered throughout the countryside or, more likely, concentrated in small agglomerations near the kilns.

The impression is that from the Augustan period to the early 2nd century AD the local urban/suburban and rural contexts were united in a single economic network, which included agricultural, manufacturing and commercial enterprises.

VI. Conclusions

Based on the data presented in this chapter the authors believe that this coastal district witnessed intensive economic growth in the late 1st century BC to the 1st century AD, a so-called Smithian growth, to use a term often used by modern economic historians.¹⁰² The Pisa sigillata is the most convincing evidence for this growth as millions of vessels were produced for over a century and traded to every geographical, economic and social context in the Romanized world. This production boom was the result of a number of favourable factors:

1. A general economic development including demographic growth, which stimulated non-food producing activities. Agriculturally generated income could thus sustain manufacturing activities;
2. The availability of raw materials (clay, fuel, water), making the large-scale production of sigillata highly lucrative;
3. Local land-owning *gentes*, who were interested in investing in production facilities (kilns and workshop equipment) and services (raw-material supply, a skilled work force);
4. Flexibility in the division of labour. Slaves, freedmen, free workers and tenants could all take part in the same production processes in the sigillata workshops or in agriculture,¹⁰³ activities that were highly seasonal and encompassed a range of tasks, demanding varying degrees of specialization;
5. An efficient infrastructural network of ports, road and river systems;
6. Guaranteed open markets, both military and civilian, as a result of the Augustan expansionist policies.

¹⁰⁰ Cherubini et al. (2006). One of these villas has recently been the subject of a detailed publication (Donati (2012)).

¹⁰¹ Costantini (2012, 80-7).

¹⁰² The term 'Smithian growth' particularly refers to an intensive development in pre-industrial societies characterized by an increase in population and average income, expansion of agricultural and manufacturing production, and integration of regional markets. Such growth is not based on technological innovation but on the division of labour and on specialization. See e.g. Jones 2000, especially xxii-xxiv). On growth in the ancient economy, see the literature mentioned in Note 69.

¹⁰³ See above, and the literature mentioned in Note 95.

To summarise, the production system of the north-Etruscan districts was characterized by a high level of interconnectivity in many of its aspects:

1. Successful interaction between global (Rome, its army and trade) and local economies, the latter encompassing communities, which exploited the area's natural potential and artisanal traditions;
2. A high degree of interconnectivity between the main towns, their ports and the scattered settlements in the countryside. All were components of the same productive, redistributive and consumption processes, thus transcending their prefixed roles; Pisae and Volaterrae were also centres of specialized manufacturing for export,¹⁰⁴ while small farmsteads were also centres of consumption;
3. A close relation between manufacturing activities and the rural context not only in agricultural production (the link between wine and amphorae is obvious), but also in the exploitation of natural resources (water, clay, wood);
4. Social interconnectivity in economic production. On the one hand, members of the elite could own villas, ceramic workshops and other enterprises. On the other, low-level workers could be deployed in various activities, depending on the demands of the season and the production process. Partially due to this interconnectivity from the late 1st century BC to the 1st century AD, north-Etruscan society was characterized by a high degree of economic and social mobility, which cut across social classes; many slaves became *servi officinatores* in the *figlinae*,¹⁰⁵ many freedmen reached the status of Augustales,¹⁰⁶ and a few of the *gentes* entered the Senate.¹⁰⁷
5. The boom-and-bust phenomenon does not seem to have led to a crisis as is documented in other Italian districts;¹⁰⁸ even the end of the Pisa sigillata production does not appear to have caused a dramatic breakdown of the local economy.

In conclusion, this district, with all its distinctiveness, was transformed upon entering the Roman globalizing economy and presumably consisted of interdependent markets,¹⁰⁹ despite its imbalances, asymmetries and uncertainties.¹¹⁰

¹⁰⁴ On the debate on towns being production areas as well as centres of consumption, see Parkins (1997); Erdkamp (2001); Santoro (2006).

¹⁰⁵ As documented by stamps on Pisan terra sigillata (Fülle (1997, 111-55)) and north Etruscan brick and tiles (Menchelli (2003)).

¹⁰⁶ Ciampoltrini (1982); Fabiani (2002).

¹⁰⁷ See Capdeville (1997); Pizzigati (1997); Segenni (2011).

¹⁰⁸ Witcher (this volume), commenting on Woods (2007).

¹⁰⁹ Taking into consideration the extensive evidence presented by Temin (2001, 169-81), we think that the 2nd century BC-1st century AD Roman economy was primarily a market economy. Even though some geographical areas and social groups could be excluded from it the economic connections documented between distant parts of the Empire confirm the existence of interdependent markets. Cf. also Greene (2006) for the overcoming of the dichotomy between the primitivistic and modernistic models; see also Mattingly and Salmon (2001b, 11).

¹¹⁰ For example according to Morris et al. (2007) we should distinguish between the ancient and modern economies; see the general criticism of Bang (2006). Concerning market integration cf. also Erdkamp (2005, 204-5).

The authors believe that their bottom-up approach has provided some evidence of this economic integration. In particular the multi-scale perspective (micro-region, Italy, the Romanized world, and beyond) has been useful in reconstructing the local economy in its complexity, while dissolving a few dichotomies on the way (rural/urban, rural/manufacturing, domestic/market-oriented, local/global, and so on). Obviously, regional variability has to be taken into account; many different situations can be expected to have existed in Italy due to combinations of local and global factors. In order to assemble the puzzle of all the different cases within this larger framework, it is our task to integrate reliable micro-regional datasets into a general network, starting from the local facts and up to Mediterranean-wide connectivity.¹¹¹

¹¹¹ Horden and Purcell (2000).

