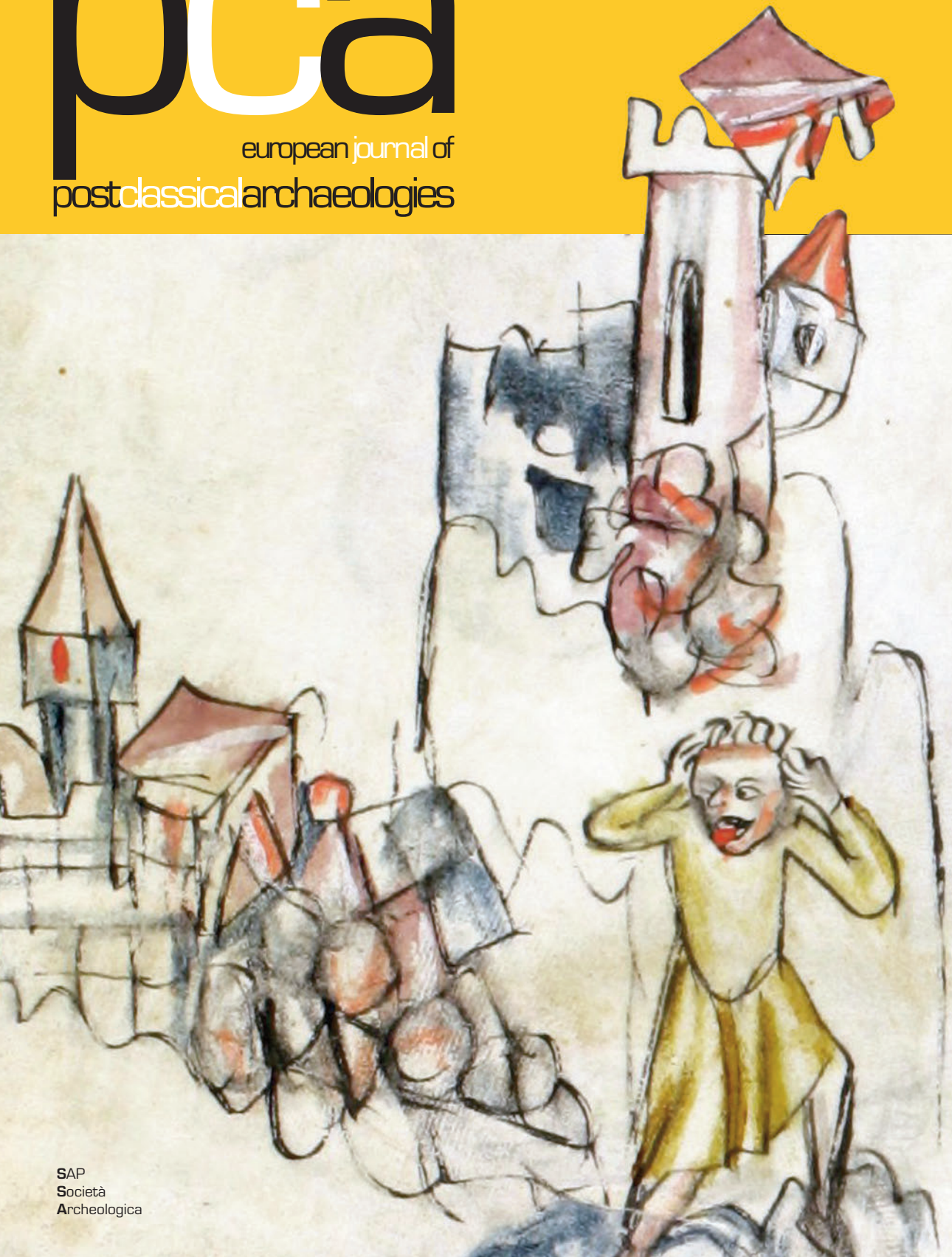
Volume 5
May 2015

pca

european journal of
postclassical archaeologies



SAP
Società
Archeologica

pca

european journal of
postclassicalarchaeologies

volume 5/2015

SAP Società Archeologica s.r.l.

Mantova 2015

Post-Classical Archaeologies (PCA) is an independent, international, peer-reviewed journal devoted to the communication of post-classical research. PCA publishes a variety of manuscript types, including original research, discussions and review articles. Topics of interest include all subjects that relate to the science and practice of archaeology, particularly multidisciplinary research which use specialist methodologies, such as zooarchaeology, paleobotany, archaeometallurgy, archaeometry, spatial analysis, as well as other experimental methodologies applied to the archaeology of post-classical Europe.

Submission of a manuscript implies that the work has not been published before, that it is not under consideration for publication elsewhere and that it has been approved by all co-authors. Each author must clear reproduction rights for any photos or illustration, credited to a third party that he wishes to use (including content found on the Internet). For more information about **ethics** (including plagiarism) and copyright practices and guidelines please visit the web site www.postclassical.it.

PCA is published once a year in May, starting in 2011. Manuscripts should be submitted to **editor@postclassical.it** in accordance to the guidelines for contributors in the webpage http://www.postclassical.it

Post-Classical Archaeologies's manuscript **review process** is rigorous and is intended to identify the strengths and weaknesses in each submitted manuscript, to determine which manuscripts are suitable for publication, and to work with the authors to improve their manuscript prior to publication.

This journal has the option to publish in **open access**. For information please visit the web site www.postclassical.it

How to **quote**: please use "PCA" as abbreviation and "Post-Classical Archaeologies" as full title.

Cover image: courtesy of Schaffhausen, Stadtbibliothek (Switzerland), Gen. 8, f. 271v – Klosterneuburger Evangelienwerk, retrieved from www.e-codices.unifr.ch/en/sbs/0008/271v/0/Sequence-1030

"Post-Classical Archaeologies" was approved on 2015-05-13 according to ERIH PLUS criteria for inclusion. Classified A by ANVUR (Agenzia Nazionale di Valutazione del sistema Universitario e della Ricerca).

DESIGN

Paolo Vedovetto

PUBLISHER

SAP Società Archeologica s.r.l.
Via Fienili 39/a, 46020 Quingentole, Mantova
www.archeologica.it

PRINTED BY

Tecnografica Rossi, Via I maggio, Sandrigo (VI)

Authorised by Mantua court no. 4/2011 of April 8, 2011

For subscription and all other information visit the web site www.postclassical.it

ISSN 2039-7895

pca
european journal of
postclassicalarchaeologies

volume 5/2015

CONTENTS PAGES

PCA 5 (2015) ISSN: 2039-7895 (pp. 149-174)
Post - Classical Archaeologies

beyond the theme

The Second Sea: exchange between the Mediterranean and the Black Sea in late antiquity

TAMARA LEWIT

Trinity College and School of Historical Studies, the University of Melbourne, Royal Parade, Parkville, Victoria 3052, Australia, *tlewit@trinity.unimelb.edu.au*

Modern scholarship has focused on the Mediterranean transport of goods in the Roman Empire. However, the Black Sea region enjoys natural advantages which were also exploited as the basis for interaction with the Mediterranean world for many centuries. While this has been recognized for earlier periods, less attention has been directed to the place of the Black Sea within Roman circulation networks. In recent years, international knowledge of the Black Sea and exchanges with the Mediterranean in the Roman and Late Antique periods has been increased through new archaeological work and international cooperation. There is evidence for a growing importance of the Black Sea in the 4th-7th centuries AD, as a second vital axis of transport.
Keywords: Black Sea, Late Antiquity, trade, amphorae, shipwrecks

Gli studiosi moderni si sono concentrati sul trasporto di anfore nel Mediterrano durante l'impero romano. Tuttavia, il Mar Nero gode di favorevoli condizioni naturali sfruttate per molti secoli come base delle interazioni con il Mediterraneo, tematica ancora poco indagata in riferimento alle reti commerciali romane, a differenza di quanto è stato studiato per i periodi precedenti. Recentemente, nuove ricerche archeologiche internazionali hanno accresciuto la conoscenza del Mar Nero e degli scambi con il Mediterraneo in epoca romana e tardoantica, e hanno documentato l'importanza crescente di questa regione nel IV-VII secolo come asse vitale secondario nei trasporti.
***Parole chiave**: Mar Nero, tarda antichità, commercio, anfore, relitti*

"Our Sea", the Mediterranean, is the recognized highway of transport in the Roman and Byzantine world. Sea traffic around the Mediterranean – whether state-directed, state-subsidized, or commercial trade – was clearly central to the exchange of goods in the Roman Empire, and even to some successor states such as Vandal Africa. This paramount role is reflected in modern scholarship, which has focused extensively on Mediterranean trade, and a number of recent important works have con-

Received: 30-09-2014 - Accepted: 10-11-2014 - Revised: 06-12-2014

tinued the study of changing routes and production foci over the centuries[1]. In this context, as Doonan points out, the Black Sea has been considered as a mere "backyard" or "marginal zone", to the all-important Mediterranean, an emphasis increased by the division between Soviet bloc and western scholars during the Cold War (Doonan 2009).

In recent years, international knowledge of the Black Sea and its connections and interactions with the Mediterranean world has been much increased through new archaeological work carried out in the last 15-20 years, including identification and analysis of Pontic amphorae and finewares[2], underwater exploration (Kassab 1998; Ward, Ballard 2004), and increased international cooperation and publication of material in western European languages since the 1990s[3]. Recent systematic investigation and publication of archaeological research at the two important harbour cities at Sinope and at Chersonesos, the southern and northern points of the shortest crossing of the Black Sea (fig. 1), and of their hinterlands and the amphora production workshops of nearby Demirci, has also greatly enhanced our understanding of this region and its trade networks[4].

It has become more widely recognized that the Black Sea region enjoys geographic advantages which have been exploited in exchanges with the Mediterranean for millennia. Favorable surface currents and important navigable rivers foster the transport of goods. In contrast to the Mediterranean, it has been noted, climatic conditions are more stable, with more regular rainfall, from which arises the rich grain production of the Crimea to the north and Danube plains to the west (Tauric Chersonesos 2003, pp. 72, 84-85; Braund 2009a). The milder climate of southern regions is suited to olive cultivation, evidenced by olive oil pressing equipment and intensive amphora production around Sinope (Doonan 2010), as well as wine production (Savvonidi 1993; Doonan 2009; Opaiț, Paraschiv 2013). Wine was also produced in northern regions, and ancient wine-presses appear in the region of Chersonesos[5]. Timber was an important resource (Hannestad 2007) and Paphlagonia, Thracian

[1] Horden, Purcell 2000; Kingsley, Decker 2001a; McCormick 2001; Rickman 2008; Reynolds 2010a; Robinson, Wilson 2011.

[2] Kassab Tezgör, Tatlican 1998; Erten *et al.* 2004; Kassab Tezgor 2007, 2009a, pp. 141-210; Opaiț 2007, 2010a, 2010b.

[3] For example, Kazanski, Soupault 2000; Sazanov 2007; Klenina 2010; Kassab Tezgör, Inaishvili 2009; Tzochev *et al.* 2011; Kassab Tezgör 2012; Tsetskhladze 2012.

[4] For example, Coleman Carter *et al.* 2000; *Tauric Chersonesos* 2003; Doonan 2004, 2010; Kassab Tezgör 2009a.

[5] *Tauric Chersonesos* 2003, pp. 72, 84-85; see also Savvonidi 1993; Højte 2005, pp. 150-152; Reynolds 2010b; discussion and references for textual evidence also in Doonan 2004, p. 95.

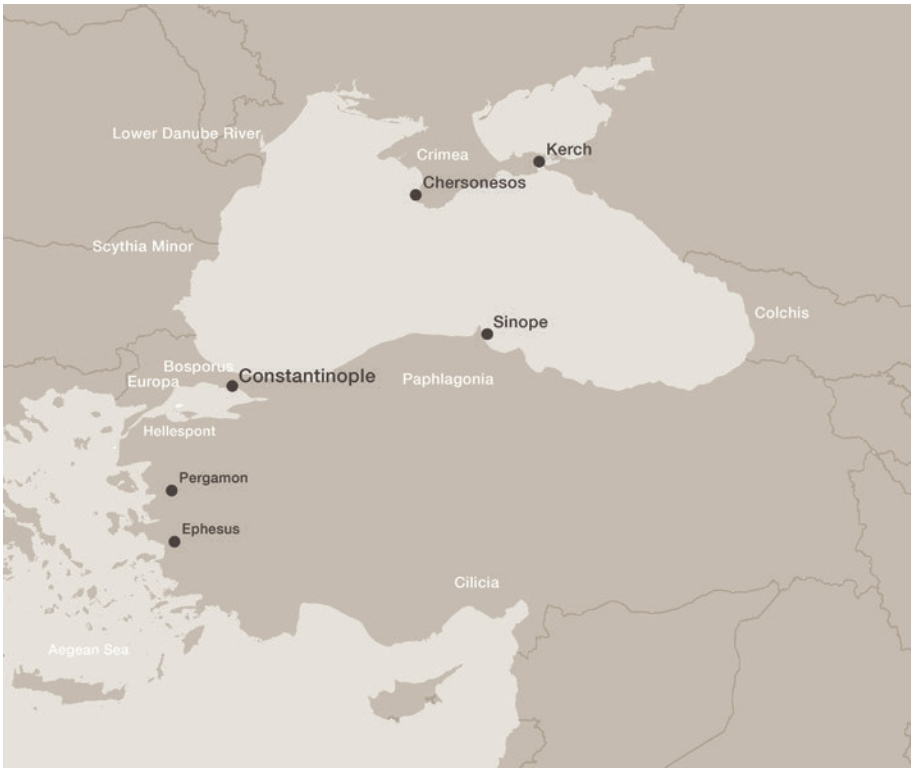


Fig. 1. Map of places mentioned in the text.

Europa and Colchis (fig. 1) were known for mineral (including salt and gold) resources (Drakoulis 2012, pp. 84-85). These natural advantages have been exploited as the basis for interaction with the Mediterranean world for centuries, beginning at least with 7th century BC Greek trade and colonisation, but possibly dating as far back as the 2nd millennium BC (Tauric Chersonesos 2003, pp. 17-20; Hiebert 2001). Another significant natural resource is the abundance of migratory freshwater fish, especially large species such as sturgeon, pike and catfish, a product reflected in the production of very large amphora types from the 2nd century BC onwards, suitable for the transport of large salted fish steaks (Højte 2005, pp. 150-152; Opaiț 2007). Amphora-borne *garum* and salt fish are recorded as well-known exports within the Roman Empire by Strabo, Aelian and Pliny, and according to Diodorus Siculus fetched high prices (Doonan 2004, p. 95). The importance of this product should not be underestimated, as fish had a particular importance in Roman luxury cuisine (Kron in press).

While this axis of exchange has come to be recognized and analyzed for the Classical and Hellenistic periods[6], far less attention has been directed to archaeological evidence of the place of the Black Sea within Roman imperial circulation networks, and in particular to its increasingly important role in the Late Antique period. Work on the circulation and distribution of goods in Roman and Late Antique periods has focused overwhelmingly on cross-Mediterranean transport. Archaeological work in recent decades has, however, yielded increasing evidence for the importance of the Black Sea in the Late Antique era, as a second vital axis of transport, consumption and production. The north-south sea route through the Hellespont and the Bosporus, at the crossroads of the Aegean, Levantine, Anatolian, and Danubian regions, linked fertile productive and important consumption centres around the Black Sea with the Mediterranean, and it seems that this traffic grew significantly from the 4th to the 7th centuries AD. In late antiquity, northward transport of supplies from the Mediterranean to the new eastern capital of Constantinople and to the Danubian troops, and southwards transport of products from the Black Sea to the Mediterranean, seem to have expanded significantly. The Late Antique evolution of this sea route also reflects changes in the broader patterns of regional production and movement of goods around the eastern Mediterranean in the 4th to 7th centuries AD, patterns increasingly confirmed in recent decades. It is thus timely to reconsider the role of the Black Sea and its productive exchanges with the Mediterranean in the 4th-7th centuries, in the light of currently available evidence.

The establishment in the 4th century of the new eastern capital of Constantinople, straddling the Bosporus (figs. 1, 2), seems to have had a huge impact on the dynamics of transport and production in the eastern Mediterranean and Black Sea region. Recent geospatial modelling by 'ORBIS: The Stanford Geospatial Network Model of the Roman World' indicates the time and price costs of travel by land, river and sea in the Roman Empire. Scheidel has pointed out that this modelling reveals a dramatic shift in transport cost contours with the establishment of the new capital. While in the early imperial period, the Black Sea had been among the most remote peripheral regions, in practical terms, in relation to Rome and the western Mediterranean, a huge change is apparent in the modelling of the 4th century. From this point, the Aegean and Black Sea constitute the "new core" and "the most accessible hinterland for Constantinople" (Scheidel 2013, pp. 20-22).

[6] See, for e.g., Tsetskhladze 1998, 2001, 2012; Papuci-Wladyka, Kokorzhitskaia 2004; Lund, Gabrielsen 2005.

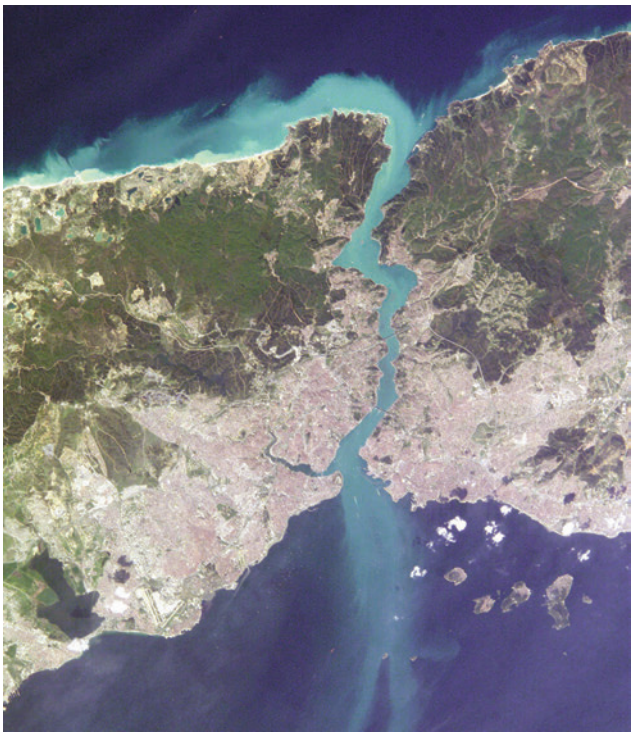
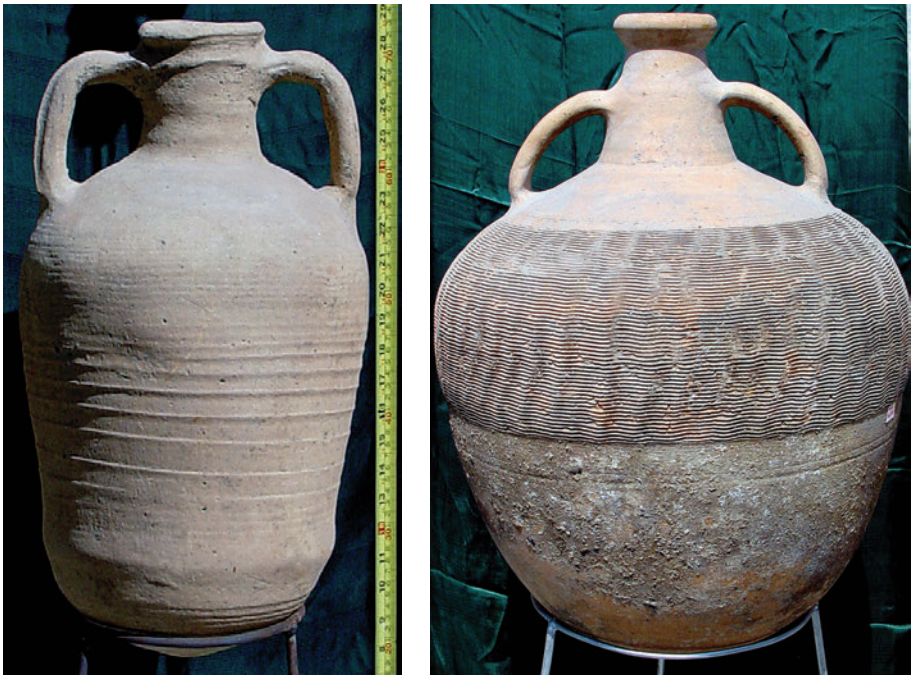


Fig. 2. The Bosporus, passage from the Mediterranean into the Black Sea. Satellite view.
Photo NASA, Astronaut photograph ISS008-E-21752 (April 16, 2004).

State-directed movement of supplies to the army garrisons in north-east frontier zone on the Danube was of tremendous importance in late antiquity. It has been estimated that more than one-third of the Empire's troops, totalling approximately 120,000 soldiers, and also accompanied by associated civilian communities, were stationed on the Danube (Whittaker 1994, pp. 99-112). In the province of Scythia alone, around 10,000 or more troops were stationed, and 40 fortresses were built between the reigns of Diocletian and Justinian (Opaiț 2004, p. 293). It is well-known that in the 1st to 2nd century crucial military supplies were brought from western Europe, most notably Baetican oil from *Hispania* and Gallic wine, and had travelled to military sites in the Danube and the Rhine via either the Atlantic or Rhône River and the Rhine. However, in the 3rd century this mass transport was interrupted by military disturbances and the usurpations of Postumus and Carausius, and possibly by the effects of imperial reorganisation of ownership and production in *Hispania*[7]. From the 3rd century, finds of the previously predominant Baeti-

[7] Whittaker 1994, pp. 99-112; Remesal Rodriguez 2002, p. 301; Carreras Monfort 2006; Reynolds 2010a, pp. 24-25.



Figg. 3-4. On the left (3), LR1 amphora found at Troesmis (Scythia). On the right (4), LR2 amphora found at Murighiol (Scythia). Photos courtesy of Andrei Opaiț.

can oil amphorae progressively dwindle at military sites on the Rhine and Danube. However, in late antiquity, military needs (and the needs of accompanying civilian markets) on the Lower Danube frontier seem to have been supplied by producers in the Aegean, the Levant and Cyprus, via shipping routes through the Hellespont and across the Black Sea to the mouth of the Danube. A number of late 3rd to 4th century inscriptions at the legionary forts of Oescus and Novae on the Lower Danube (fig. 1) indicate the presence of soldiers from Syria, Phocaea, the Cyclades and the Hellespont region who were in charge of ensuring the provisioning of troops (Swan 2004, pp. 380-381). The establishment of the *quaestura exercitus* by Justinian in AD 536, which linked the Balkans with the productive regions of the eastern Mediterranean, may have been intended to secure this Mediterranean food supply to the garrisons (Jones 1964, p. 280; Curta 2006, pp. 46-47). As demonstrated by the geospatial modelling of "ORBIS", the practical costs of transport to the Danube from western Europe would always have been extremely high, but transport routes from the Aegean to the mouth of the Danube lay within what

Figg. 5-7. On the left (5), LR3 amphora found at Kerch (Crimea); in the centre (6), LR4 amphora found at Murighiol (Scythia); on the right (7), North African spatheion (6th century) found at Cernavoda (Scythia). Photos courtesy of Andrei Opaiț.

might be termed a "green zone" of practical accessibility (see Scheidel 2013, maps 1, 2, 4, 5, 7-9, and pp. 18, 20).

The strongest material evidence for this supply route is offered by substantial finds at military sites of Late Antique East Mediterranean amphora types, especially LR1, for which production centres are known in Cilicia, Isauria and Syria in the 5th-6th and slightly later in Cyprus in the mid 6th-7th century (fig. 3), and LR2 types, probably from Asia Minor and Aegean islands (fig. 4); these are also often found with smaller quantities of LR3 from western Asia Minor, probably produced around Ephesus, Pergamon, Sardis and the Meander Valley (figs. 1, 5); and Palestinian LR4 and LR5 (fig. 6); as well as, especially from the 6th c., Tunisian amphorae and *spatheia*, which probably travelled with African grain supplies[8] (fig. 7). At military and nearby sites on the Lower Danube in the 4th to

[8] For provenances of late amphora types see Empereur, Picon 1989, pp. 223-248; Kingsley 2002, pp. 74-81; Eiring, Lund 2004a, pp. 11-14; Pieri 2007; Reynolds 2010a, p. 99; Papaioannou 2011.

6th c., LR1 and LR2 amphorae predominate[9]. From the 5th to the early 7th centuries at Novae, one of the largest frontier camps of the Lower Danube, as well as at other sites in Moesia, LR1, LR3, and LR2 types are the most common amphorae, and Palestinian LR4 and LR5 wine amphorae have also been found (Dyczek 2007; Klenina 2010, pp. 1006-1007). At the fort of Dichin, LR1 and LR2 amphorae make up 84% by weight of late 5th century amphorae found, far more abundant than more locally produced Pontic amphorae (Swan 2009, pp. 107-118), and there is also a small number of Levantine, possibly Ephesian, and African products (Swan 2007, p. 255). Thus amphora finds attest a substantial supply of wine, oil and (through proxy evidence) grain from the Aegean, western Asia Minor, Cilicia, Cyprus, Syro-Palestine, and Africa to military and associated sites in the Danube and Black Sea regions from the 3rd to 7th century, especially the 5th to late 6th c.

State-directed transport was not the only mechanism of exchange, however. The establishment and supply of military garrisons, as well as the city of Constantinople itself, represented a huge opening up of both transport routes and new markets. The state partly subsidised, and managed, although perhaps did not directly carry out, the building of substantial infra-structure intended for military and civil supplies, including roads, bridges, canals, *mansiones*, shipping and sea and river ports. Private traders could and did take advantage of this infrastructure, as well as the market of potential buyers offered by many thousands of soldiers and associated civilians. In addition, shippers or traders contracted by the state to supply the armies were granted tax exemptions, and their own cargoes were exempt from import duties. They could add to their profits by carrying private cargoes alongside state contracted or requisitioned goods, to be sold en route or to soldiers and civilians at their destination[10]. Both textual and archaeological evidence suggest that the supply ships stopped at other ports and conducted private trade in other goods, both en route and on their return journeys[11]. Thus the state and military transport routes also stimulated surplus commercial production and encouraged trade, a phenomenon which has been described as "elongated lines of trade" stimulated by tax raising, or, in the west Mediterranean context, the "tax spine" of trade (Hopkins 2002, p. 219; see also Rickman 1996, pp. 8-9; Wickham 2005, p. 709).

9 Karagiorgou 2001, 2009; Opaiț 2004, p. 307; Swan 2004, pp. 380-382; Wilkes 2005, p. 172; Swan 2007.

10 Jones 1964, pp. 828, 831; Whittaker 1994, pp. 99-112; Kingsley, Decker 2001b, pp. 7-8; Haynes 2002, pp. 118-119; Kehne 2007, pp. 328-29; Rickman 2008, pp. 5-20, esp. 10-11.

11 Abadie-Reynal 1989, pp. 157-158; Durliat 1990, pp. 397, 534; Reynolds 1995, p. 127; fig. 174; Tomber 1993, pp. 145-148; Lewit 2011, pp. 327-329.

The Late Antique evolution of a trade axis from the Mediterranean to the Black Sea also reflects the significant regional development of surplus production and commercial exchange of goods in the eastern Mediterranean in the 4th to 7th centuries AD. These centuries were a boom period for eastern Mediterranean surplus production and export of goods, including amphora-borne oil, wine and *garum*, and fineware[12]. It is now also beginning to be evident that this commercial traffic in eastern Mediterranean goods extended to the Black Sea region, and that a parallel Black Sea surplus production and export of goods to the Mediterranean experienced a similar flourishing.

Late Antique trade in Mediterranean products to the Black Sea is attested by the presence of Late Antique amphorae and finewares from the Aegean, western Asia Minor, the Levant, Egypt, and even Africa at civilian sites all around the Black Sea region. While the enormous proportion of eastern Mediterranean LR1 and LR2 amphorae are generally taken to be evidence of a state-directed supply of essential foodstuffs, other eastern Mediterranean products, such as LR3, 4 and 5, are more likely to have been luxury commercial goods (Opaiț 2004a, p. 104). This is especially the case for Late Antique North African and Phocaean finewares, since such fine pottery was not directly transported by the state or supplied as part of the military *annona*. While ARS seems to have often travelled around the Roman Empire as a secondary commercial cargo on ships transporting *annona* grain (Bonifay 2004, pp. 452-453, 478-482), since the proportion of north African products at civilian sites on the Black Sea is higher than at military sites, it has been suggested that in this region they were transported by different supply mechanisms (Swan 2007, p. 257). They also continue to be found around the Black Sea after the Vandal conquest of Africa interrupted the state-directed *annona* supply to the army and eastern capital (Opaiț 2004a, p. 105).

Judging from this ceramic evidence, the intensity of commercial trade between the Black Sea and Mediterranean, including both the eastern Mediterranean and the north of Africa, increased in the 5th century, and continued strongly in the 6th century and even the 7th century, as will be discussed in more detail below (Klenina 2010). East Mediterranean am-

[12] Abadie-Reynal 1989, 1999; Kingsley, Decker 2001a, *passim*; Reynolds 2010a; Bonifay 2003, p. 120. The changing patterns of Mediterranean trade are graphically illustrated by amphora finds from the Terme del Nuotatore, Ostia: whereas in AD 80-90, Spain and Italy account for nearly 50% of sherds, and in the first half of the second century AD more than 50% come from Gaul, Spain and Italy, by the mid 3rd century 37% of sherds are from Aegean amphorae, and 27% from north Africa (Rice 2011). Similar results emerged from the DAI-AAR excavations at the port in Ostia, with an increase in "eastern" (mainly LR 3, 5 and 6 and Kapitän I and II) amphorae from 3% in the 1st century AD to 20% (64% of wine amphorae) in the late 3rd to mid 4th century, and 12% (55% of wine amphorae) in the mid 4th to late 5th century (Martin 2008).

phorae are abundant at western Black Sea towns in the mid 5th to the beginning of the 7th century, as well as at Thracian sites further inland: LR3 amphorae from western Asia Minor begin to appear on western Black Sea/eastern Danube sites in Scythia (fig. 1) from the 4th century (Sazanov 1997, esp. p. 88; Opaiț 2004b, p. 298; Papaioannou 2011, pp. 202-203). At the fortified town of Murighiol, east Mediterranean LR1 and LR2 amphorae make up around 50% of the total, but smaller quantities of 4th to 6th century Levantine amphorae are also present (around 15% at their peak in the 5th century), as well as Phocaean fineware, and north African *spatheia* and fineware, which increase in frequency from the mid 6th century (reaching 4,8% by the early 7th century and 20% by the 2nd ½ of the 6th century respectively: Opaiț 1997-98, p. 61, 2004a, pp. 9-24, 33-39, 77-79, 96, 99). Very small quantities of 4th-5th century North African amphorae have even been found on rural farm sites in Scythia (Opaiț 1997-98, pp. 68-70). On the northern coast of Black Sea, amphorae from the Levant and eastern Mediterranean, along with abundant Phocaean and some north African finewares, are represented at various sites from the 4th or 5th century, even after the Vandal conquest, and up to the 7th century, at most sites peaking during the period from AD 575-625: for example, at Chersonesos, amphorae from Egypt, the Levant, and Africa, together with African and Phocaean finewares, appear up to the 7th century, and east Mediterranean/Aegean/Cypriot LR1 peak again in the 7th century both here and at Kerch[13] (fig. 1). LR3 amphorae from western Asia Minor dating from the 7th century have also been found in the cities of the northern Black Sea coast (Sazanov 1997, p. esp. 88; Opaiț 2004b, p. 298; Papaioannou 2011, pp. 202-203). Cretan amphorae also appear on northern Black Sea coastal sites in contexts dated to the second quarter of the 6th century to the first quarter of the 7th century (Sazanov 2014). Palestinian LR 4 and 5 amphorae, and/or African and Phocaean finewares of the mid 3rd to early 7th century have also been found at Phanagoria, Tanais, Tsibillium, Ilichovka, Tiritaka, Zenon and Tyritake[14]. In buildings and graves of the city of Petra (Tsikhisdziri) on the eastern Black Sea coast, 4th-6th century LR1 amphorae are also found (Inaishvili, Vashakidze 2009). Inscriptions at Black Sea ports record imports of wine from the Mediterranean, as well as export of hides (Curta 2006, p. 48). The presence of an Alexandrian wine merchant is attested at the western Black Sea port

[13] Sazanov 1999, pp. 265-279; Bortoli, Kazanski 2002; Sazanov 2000; Zhuravlev 2002; Fedoseev *et al.* 2010. It has been argued, particularly by Domżalski, that some fineware previously identified as Phocaean or African Red Slip may in fact be of Pontic manufacture, but even with this proviso Zhuravlev 2002 notes the "mass quantity" of Phocaean ware in the northern Black Sea from the 5th century, and Arsen'eva, Domżalski 2002 that Phocaean ware "flooded the Pontic region".

[14] Kingsley 2002, pp. 74, 79-80, fig. 20; Arsen'eva, Domżalski 2002; Sazanov 2007; Domżalski 2013.

of Tomis, where Egyptian pilgrim flasks have also been found (Opaiț 2004a, p. 105; Anderson 2007, p. 231). The importance of commercial traffic through the Hellespont in late antiquity is also attested by the establishment of a customs house at Abydos by Justinian, to implement his tax on private ships plying this route (Oikonomides 2002, p. 980).

New archaeological evidence has also revealed the growing importance in late antiquity of Black Sea products which travelled south to both the west and east Mediterranean. While such products had travelled to the Mediterranean in the 1st and 3rd centuries AD (Yvon 1999 *passim*, esp. Abadie-Reynal, pp. 255-264; Opait 2010b), amphorae of this period are found only in very small quantities at Roman sites in the Mediterranean (for example, less than 0,2% of amphora finds at Athens), perhaps because the more important Black Sea exports were those which would have left no archaeological trace – such as timber, grain and slaves – or possibly because Mediterranean amphorae were reused for Black Sea products (Lund 2007; Braund 2009b, pp. 177-178). Pontic Sigillata, which circulated in the regional Black Sea market, is also only found in small quantities in the 1st-2nd century Mediterranean (Domżalski 2012, pp. 321-322, 326). However, exports of amphora-borne products such as wine appear to have become much more significant in the later Roman period. Sinope, in particular, appears to have developed as an important centre for local export production as well as an entrepot. Sinopean 4th to 6th century amphora types, including "carrot-shaped" amphorae (fig. 8), are found in far greater quantities and at many more sites (including shipwrecks) beyond the Black Sea than earlier types. These amphorae (of which the contents were wine) were exported around the southern Anatolian coast, to the Levant, to Alexandria, and even northern Italy (Kassab Tezgör 2009b, pp. 169-171, pl. 4), and have also been found at Athens (Opaiț 2010b). Similar "carrot-shaped" amphora may also have been produced by other Black Sea centres, including Chersonesos on the northern coast and the region of Colchis on the eastern coast. While most of those exported beyond the Black Sea region seem to have originated in Sinope, some amphorae of Colchian origin have also been identified in Syro-Palestine,

Fig. 8. Sinopean "carrot-shaped" amphora (4th century). Photo courtesy of Andrei Opaiț.

although in smaller numbers, and amphorae of the 4th-5th century, possibly from Heraclea on the southern Black Sea, are found at Athens (along with some possibly from Crimea) and as far south as Palestine (Opaiț 2010a, 2010b; Erten *et al.* 2004, pp. 103-115). In Beirut, the Black Sea was the source of around 10% of all imported amphorae (around 9% from Sinope, 0.53% Crimean) in the 5th century (Reynolds 2010a, p. 90, table 15).

A second major flow of goods from the Black Sea to the Mediterranean occurred in the 6th century, attested by different amphora types less widely distributed in the Black Sea region itself, but more widely traded in the Levant and Alexandria, and inland along the Jordan and Euphrates Rivers. They are common in northern Syria, where more than 70 examples were discovered at the Syrian port of Seleucia Pieria, and they are also common in Beirut and at the Kom el-Dikka site in Alexandria (Reynolds 2010a, pp. 152-153, table 24; Kassab Tezgör 2009b, pp. 171-173, pl. 4; Vokaer 2013, p. 570). Their inland distribution includes finds at Dibsi Faraj and Zeugma on the Euphrates (Kassab Tezgör, Touma 2001).

The evidence of productive sites and ports in the Black Sea also supports a hypothesis that Pontic export production increased in late antiquity. Recent survey in the hinterland of the port of Sinope suggests intensification of specialised production in late antiquity, including use of areas of land not previously settled, rich church and villa building dating from the 5th-6th century, and a correspondingly high level of imports, even to remote areas. In the Demirci Valley, 15 km from Sinope, intensive 3rd to 6th century production of amphorae simultaneously at many kilns is associated with olive oil pressing equipment (Doonan 2004, pp. 96, 150-151; Doonan 2010; Kassab Tezgör 2009a), possibly reflecting an increased export of the agricultural products transported in these amphorae (Doonan 2006, p. 53). A very large fish-salting and *garum* production complex was established in the northern Black Sea town of Chersonesos in the 2nd-3rd centuries, and a total of around 100 fish salting vats have been found in the city. A recent examination of 19 sites with multiple wine presses – a sign of intensive capital investment and export production – indicates that on the north Black Sea coast, a period of increased production occurred from the 1st and especially from the 2nd century till at least c.300 AD, although their end date is uncertain (Marzano 2013, pp. 129-130). Thus, production and diffusion of Black Sea products seems to have intensified in late antiquity, as was the case with eastern Mediterranean production and export.

Another source of information regarding Late Antique traffic between the Mediterranean and the Black Sea is the important evidence of ship-

wrecks. In a recent survey of more than 40 shipwrecks off the western Black Sea coast of Bulgaria, dating from the Bronze Age to 18th century, nearly half of the wrecks date to the short period between the 5th and 6th centuries – mostly carrying amphorae – indicating an astonishing relative volume of traffic along the western Black Sea coast in late antiquity until its apparent contraction in the 7th century (Stanimirov 2005). A number of 4th to late 6th century Black Sea shipwrecks attest the transport of Sinopean "carrot-shaped" amphorae within the Black Sea region (Ward, Ballard 2004; Ward 2010). The late 5th century Varna wreck off the Bulgarian coast appears to have been carrying both Cilician LR1 amphorae and Zeest 80 (Swan 2009). The probably 5th century Shipwreck B located in the Black Sea just north of Sinope was carrying Sinopean jars (Ballard *et al.* 2001; Ward, Ballard 2004, p. 5). Both ships were presumably travelling to the northern Black Sea or Danube region with a cargo of amphora-borne Mediterranean or Pontic goods.

This data should be used to balance our view of Late Antique transport patterns extrapolated from shipwreck evidence which up till recently has been based primarily on western Mediterranean, and predominantly western European data. While it appears that shipping declined in quantity after the 2nd century AD, in a recent review of 1179 known wrecks only 14 (1%) were located in the Black Sea, and 845 (71%) were located in the Mediterranean around the coasts of eastern Spain, southern France, Italy and the Ionian Sea. This pattern clearly reflects the bias of modern discovery (including by recreational divers) and investigation, as well as publication in western European languages, as acknowledged by the author of the study[15]. Wrecks in the Israel/Lebanon region, and around south-east Sicily and Malta, graphed by century in the same study, show a less steep decline: an equal peak occurs around 300-500 AD in the Israel/Lebanon region, and the highest peaks in wrecks in south-east Sicily and Malta occur between 100-600 AD (Parker 2008, fig. 13). Unfortunately the Black Sea wrecks are not graphed by date in this publication, but the four antique wrecks at Sinope which have recently been investigated in detail display a similar pattern, two dating from the 2nd to the 4th centuries, and two from the 5th-7th centuries[16]. This is exactly what one would expect from the evidence, discussed above, of increasing distribution of eastern Mediterranean and Black Sea products, at the expense of Hispanic, Italian and Gallic products, and the increasing importance of eastern Mediterranean and

[15] Parker 2008, p. 188. This publication does not include a list of sites on which the graphs are based is provided, so it is impossible to know whether the calculations include the late Black Sea wrecks mentioned above, or others recently discovered nearby such as the 6th century AD TK05-AD wreck off the Bozburun Peninsula (Royal 2006).

[16] Wreck D radiocarbon dated to AD 410-520: Ballard *et al.* 2001; see also Kassab *et al.* 1998.

Black Sea shipping routes, in the 4th to 6th centuries AD, which is not easily apparent from quantification of known shipwreck numbers.

Further insight into the bias in recovery of data is provided by a map comparing findspots of shipwrecks containing (probably Aegean) Kapitän II amphorae (Parker 2008, fig. 15). This is a product which we know increased in distribution from the 3rd century: for example, at Beirut, the proportion of Kapitän II amphorae increases more than tenfold, from less than 1% of total amphorae at the start of the 3rd century to 12% in the mid 3rd century (Reynolds 2010b). The land finds indicated on the map extend from the western Mediterranean across North Africa, and throughout central Europe, the Black Sea and the Near East. Yet the pattern of known shipwrecks does not coincide: none have been discovered off the coast of the Levant, where we know that this was a significant import, or from the Black Sea or around the Turkish coast. This indicates that some eastern Mediterranean sea traffic is currently invisible to us in terms of shipwreck data. Since it was in the eastern Mediterranean and Black Sea that new hubs of production and shipping routes developed in late antiquity, it follows that significant proportion of Late Antique sea traffic may not be accurately represented by current published shipwreck data.

These Late Antique developments occurred in the 4th-7th centuries, during a time of invasions and warfare in these (and other) regions. The pattern of transport of goods must also be considered in the light of these events, and what we can reconstruct of their impact locally, and on the production and movement of goods in general. Beginning in the late 4th to early 5th century, the Black Sea region experienced multiple invasions by Goths, Slavs, Avars, Bulgars, Persians, Alans and Huns. In the 6th century Slav, Avar and Bulgar settlement was established and Byzantine troops were finally withdrawn from Thrace in the early 7th century (e.g. Curta 2006; Poulter 2007a; Liebeschuetz 2007). From the mid to late 7th century, the expansion of the Islamic Empire also profoundly impacted on the region, even beyond the immediate effects of raids and warfare. Syria, Palestine, Mesopotamia and Egypt fell to Islamic conquest, severing state food transport and trade links with the remaining Byzantine Empire. This century saw the end of the huge Mediterranean-wide, state-managed and state-funded transport and distribution systems which had earlier stimulated export production and transport of goods as well as supported big population centres. Debate rages among scholars regarding the long-term impact of these events, and the extent of their destructive effect on the economy and trade patterns of the eastern Mediterranean (summary in Kingsley 2002, pp. 86-88).

The impact of invasion in the Black Sea region is strongly reflected in archaeological and textual evidence for extensive wall and fort building.

Procopius states that Justinian built or restored more than 600 forts in this region, including lines of forts along the Danube, in the central Balkans, at Black Sea ports, in the Chersonese and in the hinterland of Constantinople[17]. This fortification program is confirmed by archaeological finds of substantial fort building and fortification of towns around the 6th century in Albania, Serbia, ex-Yugoslav Macedonia, the Danube and Bulgaria (Dunn 2004, pp. 575-578; Sodini 2007). On the northern Black Sea, the defensive walls of Chersonesos were reconstructed in the 4th to 5th century, and Justinian appears to have built lines of protective walls there and in the surrounding Crimea (Tauric Chersonesos 2003, pp. 63-64; Procopius, *Buildings,* III.7). Crow's survey of the cities of Europa suggests that considerable investment was made in the 5th-6th century fortification of a chain of small hilltop Thracian cities close to Constantinople, including Herakleia, Eudoxipolis, Medeia, and Messembria. These, together with the rebuilding by Justinian of the Chersonese Wall and the Long Wall, were intended to defend the land and sea routes to the eastern capital (Crow 2002, pp. 342-351; Procopius, *Buildings*, IV.X.12-19; Greatrex 1995). Archaeological remains of storehouses for military supplies have been found at 5th-6th century fortified settlements on the Danube, at Dichin, Montana, and Iatrus (Poulter 2004, pp. 244-245). The eastern region of Colchis was evidently also threatened by invasions and heavily fortified, and excavations reveal that the important fort of Rhodopolis was rebuilt in the late 5th or early 6th century (Agathias 3.15.9; Braund 1994, pp. 46-47, 303).

The very real military threat reflected in such fort building is attested by archaeological evidence for destruction events in Balkan regions from the 5th century onwards, associated by excavators with Slav, Avar, Bulgar and Hunnic raids. For example, widespread destruction (possibly by the Huns) occurred in the early to mid 5th century at Nicopolis ad Istrum in modern Bulgaria (Poulter 2007b). Two thick burnt layers, one in the 1st quarter of the 7th century, possibly reflecting Avar/Slav invasion, and one perhaps caused by Bulgars in the early 9th century, are attested at the fort of Kaleto, in Bulgaria (Cholakov, Chukalev 2010, pp. 724-726). Towns often seem to have evolved into fortified "*kastra*", centred on military, utilitarian and ecclesiastical functions – although often with rich and substantial church building[18]. Some urban populations may have moved to more strategic locations, as may have been the case with the new fortified town at Turnovo (Zikideva), on the highly defensible Tsaverets Hill, not

[17] Procopius, *Buildings,* III.7; IV. 7-11; Curta 2006, pp. 45-46; Crow 2002, pp. 342-351; Shephard 2009, p. 429.

[18] Sodini 2007, p. 331; Vladkova 2007, pp. 203-217; Poulter 2007b; Whittow 2007, p. 376.

far from the abandoned Nicopolis (Dintchev 1997; Curta 2006, pp. 40-42). Less evidence is available for other Black Sea regions, but the investigation of a large hilltop site with a 3rd century BC stoa (Bezymyannaya) on the Heraklean Peninsula, Crimea (fig. 1) in the northern Black Sea region has revealed occupation up to the 6th or 7th century; some destruction occurring in the mid 4th century AD has been tentatively attributed to possible Hunnic incursion, and large defensive structure was built in the late 5th or early 6th century in a style typical of fortifications of this period in Moesia, suggesting a very similar pattern of destruction and fortified hilltop settlement to that seen elsewhere (Coleman Carter *et al.* 2000). However, it should also be noted that a recent detailed study of the regions of Europa and Bithynia in the 4th-6th centuries AD, based on textual evidence and digital terrain modelling, suggests that the majority of the 54 towns occupied in this period were still located in lowland areas (mostly on road networks), including more than half which were newly founded in this era (Drakoulis 2013, pp. 240-246).

There is only scattered evidence for the effect of invasion on agricultural settlement. Recent archaeological survey in the Lower Danube area around Novae has documented a collapse in settlement in the mid 5th century, and only 13 sites can be dated to the late 5th to end 6th centuries, in comparison to the 203 sites of the early 4th to mid 5th century which reflect flourishing rural settlement in this earlier period (Conrad 2006, fig. 2). The Roman villa-based agricultural system seems to have disintegrated throughout the Balkans (Poulter 2004; Curta 2006, pp. 43-45). Even fortified villas, such as those of Pernik and Madara, appear to have been abandoned around the 5th century (Dinchev 2007). Agathias writes of deserted villages in Moesia and Scythia Minor, while legal sources record difficulty in raising taxes from agriculture (Curta 2001, p. 205; 2006, p. 44). A pattern of small fortified hilltop rural village settlements seems to have developed in the 5th to early 6th centuries, replacing more dispersed open settlement, and building activity indicates their dense occupation in the 5th-6th centuries[19]. Some former forts were reused as fortified villages, others were new foundations, and some fortified monasteries have also been found (Dinchev 2007). On the northern Black Sea, in the hinterland of Chersonesos, long-established farms seemed to have been impacted by 3rd to 6th century invasions, with evidence of fires, lack of building, and traces of small round nomadic-style habitations (Tauric Chersonesos 2003, p. 130). Similarly, the excavated 4th to 6th century farmstead at Geoevka, on the northern Black

[19] Curta 2001, p. 205; Poulter 2004, pp. 246-247; Dunn 2004, p. 570; Bavant 2007, p. 338.

Sea Kerch Peninsula (in the hinterland of Nymphaion), was destroyed by fire in the third quarter of the 6th century (Zin'ko 2006, p. 304).

In spite of such archaeological evidence for military threats and changes in both town and countryside, however, there is also some evidence of continuity and prosperity. In the southern Black Sea region around the port of Sinope, excavations and survey indicate that both the city of Sinope itself, and agricultural/industrial settlement activity in its hinterland – including extensive amphora production and church building – flourished particularly from the 4th through to the 7th centuries. A rupture in the archaeological evidence only occurs in this region from the 8th or 9th century, when the hinterland appears to have been depopulated, and only small and apparently impoverished settlements have been found in areas previously thriving with major industrial and agricultural production (Doonan 2004, especially pp. 98-111, 119, 128, 151). The 6th century was also a time of intensive church building in the port city of Chersonesos, attesting abundant surplus wealth and continued stability in the town, in spite of changes in the countryside: this included a large church complex, comprising a possible bishop's residence and the large, very richly decorated Uvarov Basilica containing a baptistery, together with the mosaic and marble decorated Basilica of 1935 to the north (fig. 9), the Western Basilica, the Reliquary Church (6th, 7th or 8th century), and the rebuilding with sumptuous mosaic floors of the Church Outside the City Walls, where the exiled Pope Martin I was buried in the 7th century (Tauric Chersonesos 2003, pp. 30, 101-117). As has been noted, the production and exchange of goods in both directions between the Mediterranean and the Black Sea seems to have grown and prospered until well into the 7th century. The Black Sea region may have become even more important as a source of goods, especially for Constantinople, after the loss of other sources of supplies to the Islamic Empire (Arthur, Sedikova 2002, p. 10; Morrisson, Sodini 2002, p. 209). The northern Black Sea was also the source of the precious flammable naphtha, which became an important naval weapon for Byzantine ships from the 6th or 7th century onwards (Shephard 2009, pp. 426-428).

This accords with the most recent archaeological evidence from the Mediterranean, which indicates that amphorae-borne African and eastern Mediterranean/Cypriot products, as well as fine pottery from Tunisia, Cyprus and Anatolia, continued to circulate up to the late 7th c., after the Islamic conquests, all around the eastern Mediterranean (Sodini, Villeneuve 1992; Arthur 2006, pp. 173-174; Armstrong 2009). Recent excavations at Paphos, in Cyprus, attest a return trade in goods from Asia Minor and Africa until the late 7th or 8th centuries (Gabrieli *et al.* 2007). Excavations of a well-dated late 7th century context in north Sinai similarly confirm continued production and wide transport (possibly

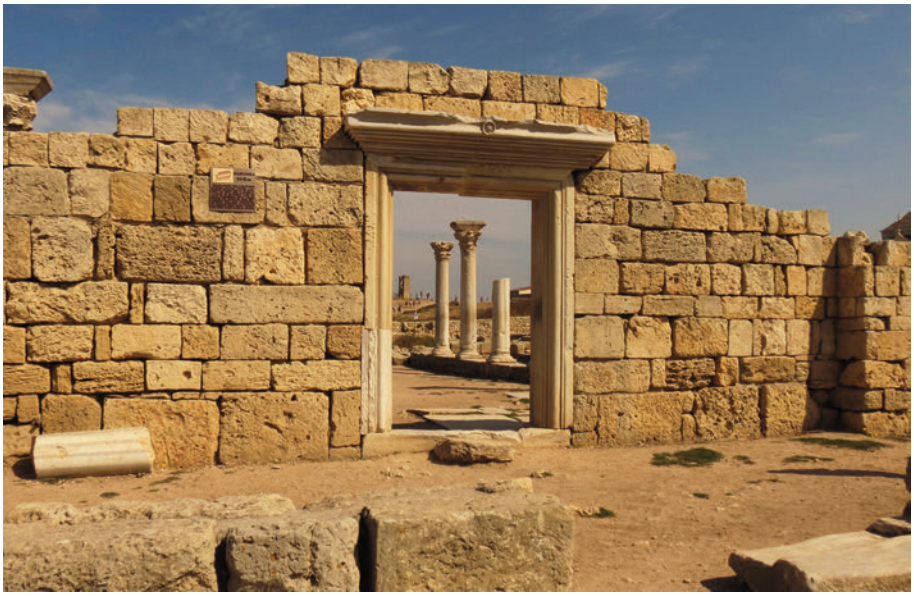


Fig. 9. The 6th century "Basilica of 1935", Chersonesos (Crimea). Photo Artem Topchiy 17/9/2012 (source http://commons.wikimedia.org/wiki/File:2012-09-17 Базилика 1935 года. Херсонес Таврический (1).jpg).

sponsored by the Church) of goods carried in African, Palestinian and Cypriot amphorae throughout the 7th century, and a strong continuity of production in the region into the Umayyad era (Arthur, Oren 1998). At the Kom el-Dikka site in Alexandria, although quantities of imported amphorae from Palestine substantially decline, and local Egyptian amphorae increase in numbers, in the mid to late 7th century LR1 from Cilicia/Cyprus continue to make up a similar proportion of finds to earlier periods (around 10% of amphorae), and Palestinian LR4 still made up around one third of amphorae (Majcherek 2004). A clear change in pattern, but continued transport and exchange, is evident by the first half of the 8th century at Beirut, where Egyptian fineware and amphorae and LR2 imitations – possibly from a Levantine source – replace previously common Cypriot and Phocaean finewares and Gazan amphorae (Reynolds 2003). Shipwreck evidence also testifies to a continued circulation of such goods in the 6th to 7th centuries: the 6th-7th century Kuyu Burnu, Çıhlı Burnu, Ekinlik Adası and Küçük Ada wrecks, carrying amphorae, terracotta tiles and pipes, and marble, have been identified in the Sea of Marmara[20]. The 7th century Yassi Ada wreck carried a cargo of 900 (mostly

[20] Günsenin 1998, pp. 312-331; Günsenin 1999; http://www.nautarch.org/cms/archaeological-sites.

eastern Mediterranean) amphorae – probably from several sources and possibly from up to seven different production locations. The inscription "[belonging to] George priest sea-captain" on a steelyard suggests the involvement of the Church in the transport of this cargo (Bass, van Doorninck 1982; van Alfen 1996, esp. p. 212). After the collapse of the unified Roman state, the Church functioned as a powerful network and could control shipping and supplies. Opaiț also notes the presence of religious *dipinti* on many LR1 and LR2 amphorae in the Danube provinces, and suggests that the Church may have been involved in their distribution (Opaiț 2004b, p. 307). Thus while invasions and the eventual collapse of imperial state systems clearly had an enormous impact on the volume of circulation of goods by the 8th century, it is also clear that surplus production, and circulation of goods around and between Africa, the eastern Mediterranean and the Black Sea, continued up to at least the 7th century.

Conclusions

Mediterranean sea routes have long been a focus of scholarly attention, and rightly seen as the heart of transport in the Roman Empire. The sea route between the Black Sea region and the Mediterranean was, however, also an important axis of both state-directed and commercial transport. In the 4th to 7th centuries, tremendous changes were in train in the eastern Mediterranean and Black Sea regions, including both a productive and commercial boom, the foundation of the new capital, and a period of extensive invasions and political change. In this context, the role of the Black Sea as both a transport route and as productive centre, whose products were diffused to the Danube and the Mediterranean, seems to have increased in importance. As greater archaeological and international attention becomes focussed on evidence from this region, its significance as a route for the transport of both local and Mediterranean products, and its even closer inter-relationship with the Mediterranean in late antiquity, increasingly demand to be recognised.

Acknowledgements

My grateful thanks to Andrei Opaiț for his invaluable advice and generous assistance with the illustrations.

References

C. Abadie-Reynal 1989, *Céramique et commerce dans le basin égéen du IV^e au VII^e siècle*, in *Hommes et richesse dans l'Empire byzantin,* I, *IV^e-VII^e siècle*, Paris, pp. 143-162.

C. Abadie-Reynal 1999, *Les amphores romaines en Mer Noire (I^er-V^e s.)*, in Y. Garlan (ed), *Production et commerce des amphores anciennes en Mer Noire*, Aix-en-Provence, pp. 255-264.

W. Anderson 2007, *Menas flasks in the West, Pilgrimage and Trade at the End of Antiquity*, "Ancient West and East", 6, pp. 221-243.

P. Armstrong 2009, *Trade in the east Mediterranean in the 8th century*, in Mundell Mango 2009, pp. 157-178.

T.M. Arsen'eva, K. Domżalski 2002, *Late Roman red slip pottery from Tanais*, "Eurasia Antiqua", 8, pp. 415-491.

P. Arthur 2006, *Form, Function and Technology in Pottery Production from Late Antiquity to the Early Middle Ages*, in L. Lavan, E. Zanini, A. Sarantis (eds), *Late Antique Archaeology 4 Technology in Transition A.D. 300-650*, Leiden, pp. 9-86.

P. Arthur, E.D. Oren 1998, *The North Sinai survey and the evidence of transport amphorae for Roman and Byzantine trading patterns*, "Journal of Roman Archaeology", 11, pp. 193-212.

P. Arthur, L. Sedikova 2002, *Chersonesos: Excavation in the Ancient City*, in C. Williams, J.C. Carter (eds), *The Study of Ancient Territories: Chersonesos and Metaponto. 2001 Annual Report Institute of Classical Archaeology*, University of Texas, Austin, pp. 9-22.

R.D. Ballard, F.T. Hiebert, D.F. Coleman, C. Ward, J.S. Smith, K. Willis, B. Foley, K. Croff, C. Major, F. Torre 2001, *Deepwater archaeology of the Black Sea: The 2000 season at Sinop, Turkey*, "American Journal of Archaeology", 105 (4), pp. 607-623.

G.F. Bass, F.H. van Doorninck 1982, *Yassi Ada. A Seventh-Century Byzantine Shipwreck*, College Station.

B. Bavant 2007, *Caričin Grad and the Changes in the Nature of urbanism in the Central Balkans in the Sixth Century*, in Poulter 2007c, pp. 337-374.

T. Bekker-Nielsen (ed) 2005, *Ancient fishing and fish processing in the Black Sea Region*, Aarhus.

G. Bilde, V.F. Stolba (eds) 2006, *Surveying the Greek Chora: Black Sea Region in a Comparative Perspective*, Aarhus.

M. Bonifay 2003, *La céramique africaine, un indice du développement économique?*, "Antiquité Tardive", 11, pp. 113-128.

M. Bonifay 2004, *Etudes sur la céramique romaine tardive d'Afrique*, BAR IS 1301, Oxford.

M. Bonifay, J.-C. Tréglia (eds) 2007, *LRCW 2. Late Roman Coarse Wares, Cooking Wares and Amphorae in the Mediterranean: Archaeology and archaeometry*, BAR IS 1662 II, Oxford.

A. Bortoli, M. Kazanski 2002, *Kherson and its Region*, in Laiou 2002, pp. 659-665.

D. Braund 1994, *Georgia in Antiquity: A history of Colchis and Transcaucasian Iberia, 550 BC-AD 562*, Oxford.

D. Braund 2009a, *Amphorae in the Eastern Black Sea: contexts of geography and exchange*, in Kassab Tezgör, Inaishvili 2009, pp. 119-125.

D. Braund 2009b, *Concluding Remarks*, in Kassab Tezgör, Inaishvili 2009, pp. 177-178.

C. Carreras Monfort 2006, *A quantitative approach to the amphorae from Xanten: a more comprehensive view of the long-distance Roman trade*, in J. von Freeden, I. Martell (eds), *Römische Amphoren der Rheinprovinzen unter besonderer Berücksichtigung des Xantener Materials*, Kolloquium (Xanten, 13-15 Januar 2004), Mainz, pp. 25-39.

I.D. Cholakov, K. Chukalev 2010, *Archaeology in Bulgaria, 2007–2009*, "American Journal of Archaeology", 114(4), pp. 715-774.

A.M. Čkonia 2002 *À Propos de l'exportation de l'or colchidien*, in M. Faudot, A. Fraysse, E. Geny (eds), *Pont-Euxin et commerce: la genèse de la "route de la soie"*, Actes du IX^e Symposium (Vani, 1999), Besançon, pp. 263-272.

J. Coleman Carter, M. Crawford, P. Lehman, G. Nikolaenko, J. Trelogan 2000, *The Chora of Chersonesos in Crimea, Ukraine*, "American Journal of Archaeology", 104(4), pp. 707-741.

S. Conrad 2006, *Archaeological Survey on the Lower Danube: Results and Perspectives*, in Bilde, Stolba 2006, pp. 309-331.

J. Crow 2002, *Recent research on the late antique cities of eastern Thrace (Provincia Europa)*, in L. Slokoska, A. Poulter (eds), *The Roman and late roman city*, International Conference (Veliko Turnovo, 26-30 July 2000), Sofia, pp. 342-351.

F. Curta 2001, *Peasants as "Makeshift Soldiers for the Occasion": Sixth-Century Settlement Paterns in the Balkans*, in T.S. Burns, J.W. Eadie (eds), *Urban Centers and Rural Contexts in Late Antiquity*, East Lansing, pp. 199-218.

F. Curta 2006, *Southeastern Europe in the Middle Ages 500-1250*, Cambridge.

M. Decker 2009, *Tilling the hateful earth: agricultural production and trade in the late antique East*, Oxford.

V. Dintchev 1997, *Zikideva – an Example of Early-Byzantine Urbanism in the Balkans*, "Archaeologia Bulgarica", 1, pp. 54-77.

V. Dintchev 2007, *The Fortresses of Thrace and Dacia in the Early Byzantine Period*, in Poulter 2007c, pp. 479-546.

K. Domżalski 2012, *At the crossroads of trade routes: terra sigillata, red slip wares and related fine pottery from the Polish excavations in Ptolemais (2002-2009)*, in J. Żelazowski (ed), *Ptolemais in Cyrenaica*, Warsaw, pp. 319-345.

K. Domżalski 2013, *Late Roman fine pottery from Tyritake (Sector XXVI, 2002-2009)*, in *Polish Archaeological Mission, Tyritake. National Museum in Warsaw*, online in http://kercz.mnw.art.pl/sites/default/files/page_upload/domzalski_krzysztof_-_late_roman_fine_pottery_from_tyritake.pdf (last accessed 13/8/14).

O.P. Doonan 2004, *Sinop landscapes: exploring connection in a Black Sea hinterland*, Philadelphia.

O.P. Doonan 2006, *Exploring Community in the Hinterland of a Black Sea Port*, in Bilde, Stolba 2006, pp. 51-58.

O.P. Doonan 2009, *The corrupting sea and the hospitable sea: some early thoughts toward a regional history of the Black sea*, in D.B. Counts, A.S. Tuck (eds), *Koine. Mediterrnaean Studies in Honour of R. Ross Holloway*, Oxford, pp. 68-74.

O.P. Doonan 2010, *Sinop Landscapes: Towards an Archaeology of Community in the Hinterland of a Black Sea Port*, "Ancient civilizations from Scythia to Siberia", 16, pp. 175-187 (also published in Kassab Tezgor 2012, pp. 175-87).

P. Drakoulis Dimitris 2012, *Regional transformations and the settlement network of the coastal Pontic provinces in the Early Byzantine period*, in Tsetskhladze *et al.* 2012, pp. 79-95.

P. Drakoulis Dimitris 2013, *European and Asiatic settlements of the Bosporus hinterland in the Early Byzantine period*, in G.R. Tsetskhladze, S. Atasoy, A. Avram, Ş. Dönmez, J. Hargrave (eds), *The Bosporus: Gateway Between the Ancient West and East (1st Millennium BC–5th Century AD)*, Proceedings of the Fourth International Congress on Black Sea Antiquities (Istanbul, 14th-18th September 2009), BAR IS 2517, Oxford, pp. 237-247.

A. Dunn 2004, *Continuity and Change in the Macedonian Countryside from Gallienus to Justinian*, in W. Bowden, L. Lavan, C. Machado (eds), *Recent Research on the Late Antique Countryside*, Leiden, pp. 535-586.

J. Durliat 1990, *De la ville antique à la ville byzantine: le problème des subsistances*, Rome.

P. Dyczek 2007, *Late Roman amphorae from the site of the valetudinarium at* Novae, in Bonifay, Tréglia 2007, pp. 27-34.

J. Eiring, J. Lund 2004a, *Introduction*, in Eiring, Lund 2004b, pp. 11-14.

J. Eiring, J. Lund (eds) 2004b, *Transport Amphorae and Trade in the Eastern Mediterranean*, Acts of the International Colloquium (Athens, September 26-29, 2002), Aarhus.

J.-Y. Empereur, M. Picon 1989, *Les régions de production d'amphores impériales en Méditerranée orientale*, in *Amphores romaines et histoire économique: dix ans de recherche*, Actes du Colloque (Sienne, 22-24 mai 1986), Rome/Paris, pp. 223-248.

P. Erdkamp (ed) 2002, *The Roman Army and the Economy*, Amsterdam.

H.N. Erten, D. Kassab Tezgör, I.R. Türkmen, A. Zararsiz 2004, *The typology and trade of the amphorae of Sinope. Archaeological study and scientific analyses*, in Eiring, Lund 2004b, pp. 103-115.

N.F. Fedoseev, K. Domżalski, A. Opaiț, A.V. Kulikov 2010, *Post-Justinian pottery deposit from Pantikapaion-Bosporos: rescue excavations at 12, Teatral'naja St. in Kerch, 2006*, "Archeologia", 61, pp. 63-94.

R.S. Gabrieli, M. Philp, C. Jackson, A. Kaldelli 2007, *Stumbling into the darkness: trade and life in post-Roman Cyprus*, in Bonifay, Tréglia 2007, pp. 791-802.

V. Gabrielsen, J. Lund (eds) 2007, *The Black Sea in Antiquity. Regional and Interregional Economic Exchanges*, Aarhus.

Y. Garlan (ed) 1999, *Production et commerce des amphores anciennes en Mer Noire*, Aix-en-Provence.

G. Greatrex 1995, *Procopius and Agathias on the defences of the Thracian Chersonese*, in C. Mango, G. Dagron, with G. Greatrex (eds), *Constantinople and its Hinterland*, Aldershot, pp. 125-129.

T.E. Gregory 2005/2010, *A History of Byzantium*, Chichester.

N. Günsenin 1998, *Récentes découvertes sur l'ile de Marmara (Proconnèse) à l'époque byzantine: épaves et lieux de chargement*, "Archaeonautica", 14, pp. 312-315.

N. Günsenin 1999, *From Ganos to Serçe Limanı: social and economic activities in the Propontis during Medieval Times illuminated by recent archaeological and historical discoveries*, "INA Quarterly", 26(3), pp. 18-23.

L. Hannestad 2007, *Timber as a trade resource of the Black Sea*, in Gabrielsen, Lund 2007, pp. 85-99.

I. Haynes 2002, *Britain's First Information revolution. The Roman Army and the transformation of economic life*, in Erdkamp 2002, pp. 111-126.

F. Hiebert 2001, *Black Sea coastal cultures: trade and interaction*, "Expedition", 43(1), pp. 11-20.

R.L. Hohlfelder (ed) 2008, *The Maritime World of Ancient Rome*, Ann Arbour.

J.M. Højte 2005, *The archaeological evidence for fish processing in the Black Sea Region*, in Bekker-Nielsen 2005, pp. 133-160.

K. Hopkins 2002, *Rome, taxes, rents and trade*, in W. Scheidel, S. von Reden (eds), *The Ancient Economy. Edinburgh Readings on the Ancient World*, Edinburgh, pp. 190-230.

P. Horden, N. Purcell 2000, *The Corrupting Sea: A Study of Mediterranean History*, Malden.

N. Inaishvili, N. Vashakidze 2009, *Typology and chronology of Greek, Roman and Early Byzantine amphorae from Petra-Tsikhisdziri*, in Kassab Tezgör, Inaishvili 2009, pp. 151-152.

A.H.M. Jones 1964, *The Later Roman Empire 284-602: A Social, Economic & Administrative Survey*, Oxford.

O. Karagiorgou 2001, *LR2: a container for the military annona on the Danubian border?*, in Kingsley, Decker 2001a, pp. 129-166.

O. Karagiorgou 2009, *Mapping trade by the amphora*, in Mundell Mango 2009, pp. 37-58.

D. Kassab Tezgör 1998, *Prospection sous-marine près de la Côte Sinopéenne: Transport d'amphores depuis l'atelier et navigation en Mer Noire*, "Anatolia Antiqua", 6, pp. 443-449.

D. Kassab Tezgör 2009a, (ed) *Les fouilles et le matériel de l'atelier amphorique de Demirci près de Sinope*, Paris.

D. Kassab Tezgör 2009b, *Le reseau commercial des amphores sinopéennes entre les IIe-IIIe s. et le VIe s. de notre ère*, in Kassab Tezgör, Inaishvili 2009, pp. 167-173.

D. Kassab Tezgör 2011, *Types amphoriques romains tardifs produits simultanément à Demirci près de Sinope et dans d'autres centres*, in Tzochev, Stoyanov, Bozkova 2011, pp. 259-264.

D. Kassab Tezgör (ed) 2012, *Sinope*: *The Results of Fifteen Years of Research*, Leiden-Boston (also published 2010 in "Ancient civilizations from Scythia to Siberia", 16).

D. Kassab Tezgör, N. Inaishvili (eds) 2009, *PATABS 1: Production and trade of amphorae in the Black Sea*, Actes de la Table Ronde Internationale (Batoumi-Trabzon, 27-29 avril 2006), Paris.

D. Kassab Tezgör, I. Tatlican 1998, *Fouilles des ateliers d'amphores à Demirci près de Sinope en 1996 et 1997*, "Anatolia Antiqua", 6, pp. 423-442.

D. Kassab Tezgör, M. Touma 2001, *Amphores exportées de Mer Noire en Syrie du Nord*, "Anatolia Antiqua", 9, pp. 105-115.

M. Kazanski, V. Soupault 2000, *Les Sites Archéologiques en Crimée et au Caucase durant l'antiquité tardive et le haut moyen-age*, Leiden.

P. Kehne 2007, *War- and Peacetime Logistics: Supplying Imperial Armies in East and West*, in P. Erdkamp (ed), *A Companion to the Roman Army*, Oxford, pp. 325-338.

C. King 2004, *The Black Sea: A History*, Oxford.

S.A. Kingsley 2002, *A Sixth-Century AD Shipwreck off the Carmel Coast, Israel. Dor D and Holy Land Wine Trade*, BAR IS 1065, Oxford.

S. Kingsley, M. Decker (eds) 2001a, *Economy and Exchange in the East Mediterranean during Late Antiquity*, Proceedings of a Conference (Oxford, 29th May 1999), Oxford.

S. Kingsley, M. Decker 2001b, *New Rome, new theories on inter-regional exchange. An introduction to the East Mediterranean economy in Late Antiquity*, in Kingsley, Decker 2001a, pp. 1-27.

E. Klenina 2010, *Trade relations between the Mediterranean and the Black Sea region in the 3rd-6th centuries A.D. in the light of ceramic artifacts*, in Menchelli *et al.* 2010, pp. 1005-1014.

G. Kron in press, *Ancient fishing and fish farming*, in G. Campbell (ed), *Oxford Handbook of Animals in Classical Thought and Life*, Oxford.

A.E. Laiou (ed) 2002, *The Economic History of Byzantium from the Seventh through the Fifteenth Century*, Dumbarton Oaks.

T. Lewit 2011, *Dynamics of fineware production and trade in the 1st to 7th centuries AD: the puzzle of supra-regional exporters*, "Journal of Roman Archaeology", 24, pp. 313-332.

J.H.W.G. Liebeschuetz 2007, *The Lower Danube Region under pressure: from Valens to Heraclius*, in Poulter 2007c, pp. 101-134.

J. Lund 2007, *The Circulation of Ceramic Fine Wares and transport Amphorae from the Black Sea Region in the Mediterranean, c. 400 BC-AD 200*, in Gabrielsen, Lund 2007, pp. 183-194.

J. Lund, V. Gabrielsen 2005, *A fishy business. Transport amphorae of the Black Sea Region as a source for the trade in fish and fish products in the Classical and Hellenistic Periods*, in Bekker-Nielsen 2005, pp. 161-168.

P. Magdalino 2000, *The maritime neighbourhoods of Constantinople: commercial and residential functions. Sixth to Twelfth Centuries*, "Dumbarton Oaks Papers", 54, pp. 209-226.

G. Majcherek 2004, *Alexandria's long-distance trade in Late Antiquity - the amphora evidence*, in Eiring, Lund 2004b, pp. 229-237.

A. Martin 2008, *Imports at Ostia in the Imperial Period and late antiquity: the amphora evidence from the DAI-AAR excavations*, in Hohlfelder 2008, pp. 105-118.

A. Marzano 2013, *Capital investment and agriculture: multi-press facilities from Gaul, the Iberian Peninsula, and the Black Sea Region*, in A. Bowman, A. Wilson (eds), *The Roman Agricultural Economy. Organization, Investment, and Production*, Oxford, pp. 107-142.

M. McCormick 2001, *Origins of the European Economy: Communications and Commerce, AD 300-900*, New York.

S. Menchelli, S. Santoro, M. Pasquinucci, G. Guiducci (eds) 2010, *LRCW3 Late Roman coarse wares, cooking wares and amphorae in the Mediterranean*, BAR IS 2185 II, Oxford.

C. Morrisson, J.-P. Sodini 2002, *The Sixth-Century economy*, in Laiou 2002, pp. 171-220.

M. Mundell Mango (ed) 2009, *Byzantine Trade, 4th-12th Centuries. The Archaeology of Local, Regional and International Exchange*, Papers of the 38th Spring Symposium of Byzantine Studies (Oxford, March 2004), Oxford.

N. Oikonomides 2002, *The role of the Byzantine State in the economy*, in Laiou 2002, pp. 973-1058.

A. Opaiț 1997-98, *North African and Spanish amphorae in Scythia Minor*, "Il Mar Nero", 3, pp. 47-95.

A. Opaiț 2004a, *Local and Imported Ceramics in the Roman Province of Scythia (4th-6th centuries AD): Aspects of Economic Life in the Province of Scythia*, Oxford.

A. Opaiț 2004b, *The Eastern Mediterranean amphorae in the Province of Scythia*, in Eiring, Lund 2004b, pp. 293-308.

A. Opaiț 2007, *A weighty matter: Pontic fish amphorae*, in Gabrielsen, Lund 2007, pp. 101-121.

A. Opaiț 2010a, *Sinopean, Heraklean and Chersonesan "Carrot" amphorae*, "Ancient civilizations from Scythia to Siberia", 16, pp. 371-401 (also published in Kassab Tezgor 2012, pp. 371-401).

A. Opaiț 2010b, *Pontic wine in the Athenian market*, in D. Papanikola-Bakirtzi, K. Kousoulakou (eds), *Proceedings of the Symposium: Late Antique Ceramics from Greece (3rd-7th c.c.)*, (Thessaloniki, November 12th-16th, 2006), Thessaloniki, pp. 108-130.

A. Opaiț, D. Paraschiv 2013, *On the wine, olive oil and fish supply of the countryside in Roman Dobrudja (1st to 3rd centuries AD)*, in L. Buzoianu, P. Dupont, V. Lungu (eds), *PATABS III, Production and Trade of Amphorae in the Black Sea*, Actes de la Table Ronde internationale (Constanța, 6-10 octobre 2009), Constanța, pp. 317-336.

T. Papaioannou 2011, *A reconstruction of the maritime trade patterns originating from western Asia Minor during Late Antiquity, on the basis of ceramic evidence*, in D. Robinson, A. Wilson (eds), *Maritime Archaeology and Ancient Trade in the Mediterranean*, Oxford, pp. 197-210.

E. Papuci-Wladyka, T.N. Kokorzhitskaia 2004, *Greek amphorae from the Polish-Ukrainian excavations at Koshary, Odessa District (Fourth and Third centuries BC): a first presentation*, in Eiring, Lund 2004b, pp. 313-324.

A.J. Parker 1992, *Ancient Shipwrecks of the Mediterranean & the Roman Provinces*, BAR IS 580, Oxford.

A.J. Parker 2008, *Artifact distributions and wreck locations: the archaeology of Roman commerce*, in Hohlfelder 2008, pp. 177-196.

D. Pieri 2007, *Les centres de production d'amphores en Mediterranée orientale durant l'antiquité tardive: quelques remarques*, in Bonifay, Tréglia 2007, pp. 611-626

A. Poulter 2004, *Cataclysm on the lower Danube: the destruction of a complex Roman landscape*, in N. Christie (ed), *Landscapes of Change: Rural Evolutions in Late Antiquity and the Early Middle Ages*, Aldershot, pp. 223-254.

A. Poulter 2007a, *The transition to Late Antiquity*, in Poulter 2007c, pp. 1-50.

A. Poulter 2007b, *The transition to Late Antiquity on the Lower Danube: the city, a fort and the countryside*, in Poulter 2007c, pp. 51-97.

A. Poulter (ed) 2007c, *The Transition to Late Antiquity on the Danube and Beyond*, Oxford.

J. Remesal Rodriguez 2002, *Baetica and Germania. Notes on the concept of 'provincial interdependence', in the Roman Empire*, in Erdkamp 2002, pp. 293-308.

P. Reynolds 1995, *Trade in the Western Mediterranean, AD 400-700: The Ceramic Evidence*, BAR IS 604, Oxford.

P. Reynolds 2003, *Pottery and the economy in 8th century Beirut: an Umayyad assemblage from the Roman imperial baths (BEY 045)*, in Ch. Bakirtzis (ed), *Actes de VIIe Congrès International sur la Céramique Médiévale en Méditerranée* (Thessaloniki, 11-16 Octobre 1999), Athens, pp. 725-734.

P. Reynolds 2010a, *Hispania and the Roman Mediterranean, AD 100-700: Ceramics and Trade*, London.

P. Reynolds 2010b, *Trade networks of the East, 3rd to 7th centuries: the view from Beirut (Lebanon) and Butrint (Albania) (fine wares, amphorae and kitchen wares)*, in Menchelli *et al.* 2010, pp. 89-114.

C. Rice 2011, *Ceramic assemblages and ports*, in Robinson, Wilson 2011, pp. 81-92.

G. Rickman 1996, *Mare nostrum*, in E.E. Rice (ed), *The Sea and History*, Phoenix Mill, pp. 1-14.

G. Rickman 2008, *Ports, ships, and power in the Roman world*, in Hohlfelder 2008, pp. 5-20.

D. Robinson, A. Wilson (eds) 2011, *Maritime Archaeology and Ancient Trade in the Mediterranean*, Oxford.

J. Rougé 1966, *Recherches sur l'organisation du commerce maritime en Méditerranée sous l'Empire romain*, Paris.

J.G. Royal 2006, *The 2005 remote-sensing survey of the South-Eastern Bozburun Peninsula, Turkey: shipwreck discoveries and their analyses*, "The International Journal of Nautical Archaeology", 35(2), pp. 195-217.

N. Savvonidi 1993, *Wine-making on the northern coast of the Black Sea in Antiquity*, in M.-C. Amouretti, J.-P. Brun (eds), *La production du vin et de l'huile en Méditerranée; Oil and Wine Production in the Mediterranean Area*, Paris, pp. 227-235.

A. Sazanov 1997, *Les amphores de l'antiquité tardive et du moyen age: continuité ou rupture? Le cas de la Mer Noire*, in G. Démains d'Archimbaud (ed), *La céramique Médiévale en Méditerranée*, Actes du VIe Congres de l'AIECM2 (Aix-en Provence, 13-18 novembre 1995), Aix-en Provence, pp. 87-102.

A. Sazanov 1999, *Les amphores <LA 1 Carthage> dans la région de la Mer Noire (typologie et chronologie: Ve - VIIe s. apr. J.-C.)*, in Y. Garlan (ed), *Production et commerce des amphores anciennes en Mer Noire*, Aix-en-Provence, pp. 265-279.

A. Sazanov 2000, *Les ensembles clos de Chersonese de la fin du Viè-troisieme quart du VIIè siècles: La chronologie de la céramique*', in M. Kazanski, V. Soupault (eds), *Les sites archéologiques en Crimée et au Caucase durant l'antiquité tardive et le haut Moyen-Age*, Leiden-Boston, pp. 123-149.

A. Sazanov 2007, *Les amphores orientales d'époque protobyzantine au nord de la Mer Noire: chronologie et typologie*, in Bonifay, Tréglia 2007, pp. 803-815.

A. Sazanov 2014, *Cretan amphorae from the northern Black Sea region: Contexts, chronology, typology*, in N. Poulou-Papadimitriou, E. Nodarou, V. Kilikoglou (eds), *LRCW 4. Late Roman Coarse Wares, Cooking Wares and Amphorae in the Mediterranean: Archaeology and archaeometry*, BAR IS 2616 I, Oxford, pp. 399-409.

W. Scheidel 2013, *The shape of the Roman world*, in Princeton-Stanford Working Papers in Classics, online in http://orbis.stanford.edu/orbis2012/assets/Scheidel_59.pdf (last accessed 28/8/14).

J. Shephard 2009, *'Mists and portals': the Black Sea's north coast*, in Mundell Mango 2009, pp. 421-441.

J.-P. Sodini 2007, *The transformation of cities in Late Antiquity within the Provinces of Macedonia and Epirus*' in Poulter 2007c, pp. 311-336.

J.-P. Sodini, E. Villeneuve 1992, *Le passage de la céramique byzantine à la céramique omeyyade en Syrie di Nord, en Palestine et en Transjordanie*, in P. Canivet, J.-P. Rey-Coquais (eds), *La Syrie de Byzance à l'Islam VIIe-VIIIe siècles*, Actes du colloque international (Lyon-Paris, 11-15 Septembre 1990), Damascus, pp. 195-218.

S. Stanimirov 2003, *Underwater archaeological sites from Ancient and Middle Ages along the Bulgarian Black Sea Coast – Classification*', "Archaeologia Bulgarica", 7, pp. 1-34.

V.G. Swan 2004, *Dichin (Bulgaria) and the supply of amphorae to the Lower Danube in the Late Roman-Early Byzantine Period*, in Eiring, Lund 2004b, pp. 371-382.

V.G. Swan 2007, *Dichin (Bulgaria): interpreting the ceramic evidence in its wider context*, in Poulter 2007c, pp. 251-280.

V.G. Swan 2009, *Dichin (Bulgaria): the destruction deposits and the dating of Black Sea amphorae in the fifth and sixth Centuries A.D*, in Kassab Tezgör, Inaishvili 2009, pp. 107-118.

Tauric Chersonesos Institute of Classical Archaeology and National Preserve 2003, *Crimean Chersonesos. City, Chora, Museum, and Environs*, Austin.

R. Tomber 1993, *Quantitive approaches to the investigation of long-distance exchange*, "Journal of Roman Archaeology", 6, pp. 142-166.

G. Tsetskhladze (ed) 1998, *The Greek Colonisation of the Black Sea Area*, Stuttgart.

G. Tsetskhladze (ed) 2001, *North Pontic Archaeology*, Leiden.

G. Tsetskhladze (ed) 2012, with the assistance of E. Lafli, J. Hargrave, W. Anderson, *The Black Sea, Paphlagonia, Pontus and Phrygia in Antiquity: Aspects of Archaeology and Ancient History*, BAR IS 2432, Oxford.

C. Tzochev, T. Stoyanov, A. Bozkova (eds) 2011, *PATABS 2: Production and Trade of Amphorae in the Black Sea*, Acts of the International Round Table (Kiten-Nessebar-Sredetz, September 26-30, 2007), Sofia.

P.G. van Alfen 1996, *New light on the 7th-c. Yassi Ada shipwreck: capacities and standard sizes of LRA 1 Amphoras*, "Journal of Roman Archaeology", 9, pp. 189-213.

P. Vladkova 2007, *The Late Roman Agora and the state of civic organization*, in Poulter 2007c, pp. 203-217.

A. Vokaer 2013, *Pottery production and exchange in Late Antique Syria (Fourth-Eighth Century A.D.). A study of some imported and local wares*, in L. Lavan (ed), *Local Economies? Production and Exchange of Inland Regions*, Leiden, pp. 567-606.

C. Ward 2010, *Four Ships of Late Antiquity in the Black Sea*, "Ancient civilizations from Scythia to Siberia", 16, pp. 189-98 (also published in Kassab Tezgor 2012, pp. 189-98).

C. Ward, R.D. Ballard 2004, *Deep-water archaeological survey in the Black Sea Deep-water Archaeological Survey in the Black Sea: 2000 Season*, "The International Journal of Nautical Archaeology", 33(1), pp. 2-13.

C.R. Whittaker 1994, *Frontiers of the Roman Empire: A Social and Economic Study*, Baltimore-London.

M. Whittow 2007, *Nicopolis ad Istrum: Backward and Balkan?*, in Poulter 2007c, pp. 375-389.

C. Wickham 2005, *Framing the Early Middle Ages*, Oxford.

J.J. Wilkes 2005, *The Roman Danube: an archaeological survey*, "Journal of Roman Studies", 95, pp. 124-225.

D.V. Zhuravlev 2002, *Terra sigillata and Red Slip Pottery in the North Pontic region (a short bibliographic survey)*, "Ancient civilizations from Scythia to Siberia", 8, pp. 237-309.

V.N. Zin'ko 2006, *The Chora of Nymphaion (6th century BC - 6th century AD)*, in Bilde, Stolba 2006, pp. 289-308.