

Economy and Exchange in the East Mediterranean during Late Antiquity

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Front cover image is of a ship transporting bag-shaped amphorae (LR5), depicted on a fifth century AD mosaic from the 'House of Kyrios Leontis' at Scythopolis, Israel. Courtesy of the Israel Antiquities Authority

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LR2: a Container for the Military *annona* on the Danubian Border?¹

Olga Karagiorgou

Στους γονείς μου, Ευάγγελο και Ελευθερία

Introduction: LR2 Typology, Distribution and Quantification

Scholarly research on amphora studies during the last three decades has emphasised the pivotal importance of distribution maps, quantified data, and the use of scientific methods for determining provenance and content in drawing conclusions about various aspects of the ancient economy. It is evident that all such conclusions are subject to constant revision and refinement, as the number of publications on amphora studies from various sites grows and scientific methodologies are improved.

Bearing these initial remarks in mind, sufficient old and new data are now available to warrant revisiting the available archaeological evidence for a particular late Roman amphora, which, while present across the Mediterranean, seems to have been remarkably popular in the Balkan and Aegean world. This is the LR2 (as defined in excavations at Carthage), one of six Roman amphorae that Riley termed “a standard ‘package’ of amphora types from diverse origins...common throughout the Roman Mediterranean during the later fifth and sixth centuries.”² Due to editorial restrictions, this reappraisal of LR2 is restricted here to the Aegean and North Balkans (its wider circulation within the Mediterranean is treated at length in my forthcoming thesis³). This choice over the north-east Mediterranean is justified by two main reasons. Firstly, LR2 is an amphora of particular importance for the Aegean and North Balkans, since it occurs here much earlier (already in the fourth century) and in much larger quantities than in the rest of the Mediterranean world.⁴ Secondly, important pottery publications from Balkan and Aegean sites that have appeared during the last two decades have significantly enriched the evidence available about the ‘history’ of this amphora type; it is necessary, therefore, to summarise this new evidence, in order to reassess the profile of this amphora and update our knowledge about its distribution, quantification and provenance. Particular emphasis will be given to quantified amphora assemblages, since they offer a numerical indication of the frequency of LR2 occurrences, and enable us to compare its popularity with similar data relating to the five other amphorae in Riley’s ‘package’. It is hoped that to a certain extent this process will enhance our “limited and fragmentary” knowledge of one major East Mediterranean amphora type⁵ and will lead to some interesting observations regarding economic activity in the north-eastern Mediterranean during Late Antiquity.

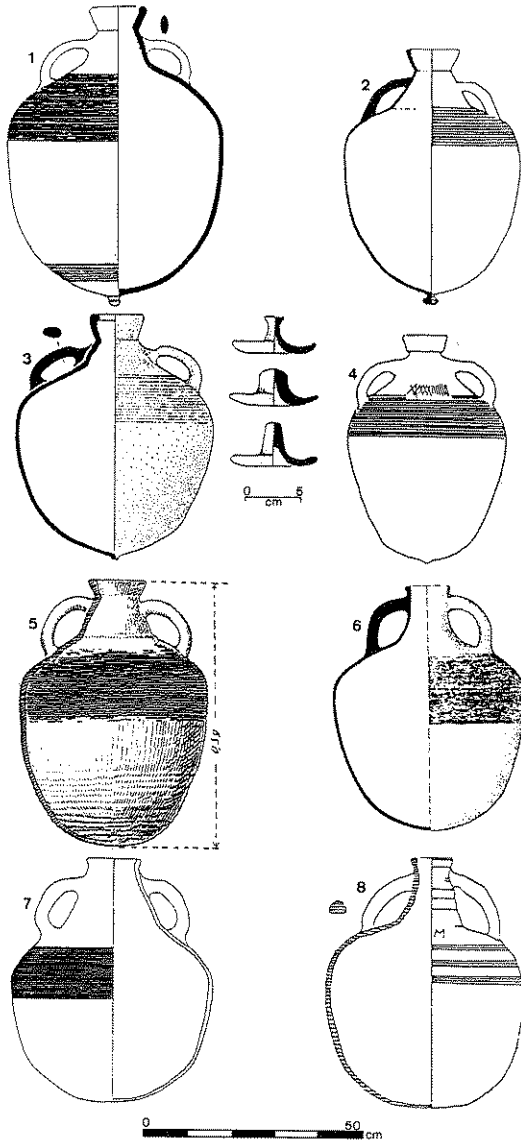


Fig. 7.1: LR2 amphorae.

1. Torone, used for an infant burial (from Papadopoulos, 1989: fig. 11a);
2. Sucidava, fourth century (from Opait, 1984: tafel II.I);
3. Iatrus, amphora and three lids of the first half of the fifth century (from Böttger, 1982: tafel 17, no. 220 and tafel 250, nos. 309–311);
4. Tomis, last quarter of the fifth or beginning of sixth century (from Opait, 1984: tafel II.4);
5. Histria, sixth century (from *Histria Monografie Archeologica Vol. 1*, 1954: 459, fig. 383);
6. Yassi Ada, A.D. 625/626 (from Bass and van Doorninck, 1982: fig. 8–5, no. CA14);
7. Chios, from the northwest fortress tower at Emporio, A.D. 641–673/4 (from Boardman *et al.*, 1989: fig. 36, no. 236);
8. Samos, from a seventh century context in the cisterns near the Efpalinos tunnel (after Hautumm, 1981: abb. 23).

LR2 is a broad-bellied, wheel-made container with a wide shoulder, tapered neck, and conical or cup-shaped mouth (Fig. 7.1). The body is usually globular and the base generally incorporates a small protrusion in the centre (at least in the case of early variants). The maximum diameter of the vessel occurs at the shoulder, usually at three-fifths of the total height. Handles are crudely crafted, flattened, and oval in cross section. They are asymmetrically placed, sloping obliquely from neck to shoulder. The vessel is decorated with a series of parallel, closely-aligned ridges extending across the upper shoulders, which were made with a single-pointed instrument that was slowly

raised in a continuous spiral, while the vessel was turned on the wheel.⁶ The application of the decoration preceded the handle attachment.

In the existing amphora typologies, scholars have identified sub-types of LR2 (Fig. 7.1).⁷ It is not easy in all cases to decide whether these formal variations reflect locally produced variants imitating imported (proto)types,⁸ or whether they are expressions of the chronological evolution of the type. Scholars, however, who have worked on well-stratified LR2 samples have traced the chronological evolution of some of the type's formal characteristics between the fourth and seventh centuries and have suggested that a certain transformation occurs around the second half of the sixth century:⁹ from a vessel with cup-shaped mouth, thick flaring rim, conical neck, large globular body and rounded base with projecting toe, LR2 turns into a vessel with a somewhat more cylindrical neck, narrower mouth, shorter lip, more elongated body and completely rounded base. In the following discussion, LR2 of both the earlier and the later forms will be included and clear distinctions between them will be drawn only in those cases where this can serve as an important dating criterion.

Modern scholarship rightly stresses that "a type can only be properly defined on the basis of *both* form and fabric",¹⁰ a remark that is increasingly being acted on in pottery publications.¹¹ However, the study of fabrics is far from simplistic, as secure identification of wares ideally presupposes the existence of an extensive database which enables stratified sherds to be linked scientifically with the petrographic characteristics of quarried clay. Since the study of fabrics is generally relatively undeveloped and neglected in most old and modern published reports, adopting a traditional approach in this paper, which principally emphasises vessel form, has been unavoidable.

A final observation should be made about quantification, arguably one of the most controversial tools used within amphora studies. On the one hand, it has been praised as a necessary supplement to typological studies and distribution maps, allowing individual amphora types to be numerically assessed within a site's excavated amphora assemblage and providing insights into the relative quantities exchanged over long-distances. On the other hand, it has been contemplated with suspicion – and sometimes even dismissed – due to a number of potential problems, particularly concerning the subjectivity of identification and dating,¹² the spatial variability and relative size of the amphora deposits sampled (excavated material represents only a part, and not always the most representative one, of an entire ancient site), and the methodological differentiation used to quantify sherds.¹³ These warnings are indeed pertinent, but instead of causing mistrust, or the abandonment of quantification as a primary tool for investigating trade, they should lead to a more rigorous analysis of pottery assemblages as a means of improving the present situation. *Ideally*, quantified data should rely on a refined and widely accepted typological model (where sub-types are based on form and/or fabric variations) and should be accompanied by detailed information about the following four points: the size of the excavated area where the sample originates in relation to the total size of the ancient site; the function of the excavated context (public, domestic, commercial, religious); other contextual data (stratigraphy, coins, fine wares), which can contribute to the secure dating of the stratum from which the amphorae derive; and the method of quantification implemented (analysis by weight, count, estimated vessel-equivalents).

Not all of the amphora studies discussed below adhere to this 'ideal' style of presentation, either because they were products of their time (e.g. quantification is absent in pre-1970s amphora studies), because they reflect the judgment and fieldwork methods of the individual researcher, or simply because information on the four points enumerated above was not available at the time the site report was written. These studies present amphora assemblages from various types of site and contexts and they use a variety of classification and quantification systems. Despite the variance in standards, I believe that the presentation of this evidence together still indicates general trends regarding communication and economic activity.

In order to present the evidence in a clear way and to facilitate conclusions, I have tried to 'homogenise' these studies according to the 'ideal style of presentation' commented on above: the various classification systems used in these studies have been translated into the classification system adopted in this volume of papers, and issues like the function of the excavated area, its date (on coin finds or other historical evidence), the volume of the amphora finds, and the quantification method used are discussed specifically when this information is available. If quantified data are absent, then any information on the popularity of a certain type, albeit of more or less subjective nature, is taken into account (e.g. the personal impression of the excavator(s) about type frequency).

This study attempts to discuss sites within the Balkan peninsula and the Aegean world, where LR2 finds have been recorded, as comprehensively as possible. In order to handle the material in a coherent way, the presentation of the sites follows a specific geographical route. Starting from the capital of the Byzantine Empire, I then turn immediately to the North Balkans following a roughly west-east route (via the Former Yugoslav Republic of Macedonia, Serbia, Bulgaria, Rumania), and subsequently address the Aegean evidence, from the Yassi Ada shipwreck to the south-east, anti-clockwise to sites and islands in the eastern, northern and western Aegean respectively.¹⁴

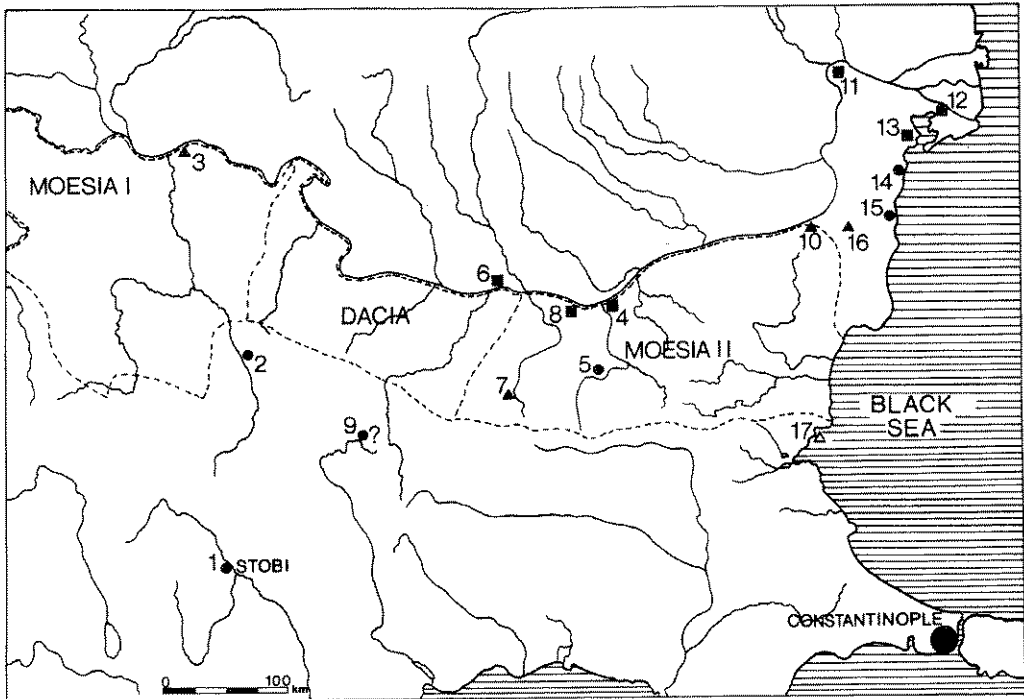
Distribution and Quantification of LR2 on North Balkan and Aegean Sites

A. Constantinople

At Saraçhane,¹⁵ the only site in the Byzantine capital where pottery from well stratified deposits has been published, Riley's entire amphora 'package' is present. LR1, representing about 15–20% of sixth and seventh century deposits, has precedence over all other types. Despite the fact that LR2 had been manufactured since the fourth century, it appears surprisingly late at Saraçhane (early sixth century deposits) and continues to keep a low profile during the seventh century (only 2–3% of all amphorae).

North Balkans (Fig. 7.2)

LR2 seems to be very popular in the North Balkans (especially in Bulgaria and the Dobroudja region in Rumania), but a lack of final publications on well-stratified and quantified pottery finds for most sites impedes full appreciation of the importance of this type in the area.



▲ MILITARY ● CIVILIAN ■ BOTH ▲ SHIPWRECK

FYROM**	Serbia	Bulgaria	Rumania
1. Stobi*	2. Justiniana Prima*	4. Iatrus*	6. Sucidava
	3. Viminacium*	5. Nikopolis*	10. Sacidava
		7. Golemanovo Kale*	11. Dinogetia
		8. Novae	12. Independenta*
		9. Pernik	13. Topraichioi*
		10. Neseber	14. Histria
			15. Tomis
			16. Tropaeum Traiani
			17. Neseber*

* Quantified data available

** Former Yugoslav Republic of Macedonia

Fig. 7.2: Map of archaeological sites in the North Balkans discussed in the text. (Drawing: S. Kingsley).

The pottery finds from Stobi cover the period from the earliest documented occupation of the site in the third century B.C. until its abandonment in the sixth century A.D.¹⁶ All of Riley's amphora 'package' is present, except LR5.¹⁷ LR1 was found in deposits dated between the fourth and the sixth centuries and LR2 in contexts of the early to middle fifth centuries. The nature of the pottery publication from Stobi does not allow conclusions about the relative frequency of individual amphorae types from the site to be drawn; only LR3's rarity is noted specifically.

At Justiniana Prima, some LR2 were found among the transport vessels from the 1978–1983 excavations in the south-west quarter of the Upper City, where a number of buildings of military character (*principia*?) were identified.¹⁸ No quantified data were included in the site publication, but it is clearly stated that “les amphores était particulièrement rares dans le quartier sud-ouest de la Ville Haute: chaque type, sauf le type V/3 (i.e. LR8) n’est représenté que par un petit nombre d’exemplaires”.¹⁹ The assemblage does, however, include LR1 and LR2.

Archaeological research at the late antique fort on the site of Svetinja (about 1,200 m east of Viminacium) brought to light a substantial pottery assemblage, which the excavators dated from A.D. 567 to 596.²⁰ The pottery, retrieved from seven houses built along the rampart, consisted mainly (88%) of sherds belonging to seven amphora types. Only four types from Riley’s ‘package’ were represented: the overwhelming majority of sherds belonged to LR1 (54%) and LR2 (42%), while LR4 and LR8 were poorly represented.

A positive development for future pottery studies on Bulgarian sites is exemplified by the work of Böttger on the pottery from Iatrus, and Falkner on the pottery from Nicopolis ad Istrum. The 1992 publication of pottery from Golemanovo Kale provides a useful source of comparative material, while the anticipated publication of the settlement of Dichin (about 10 km west of Nicopolis ad Istrum), where research was initiated in 1996 under the direction of Dr. A. Poulter, will further complete the regional picture.

Iatrus (near the modern Bulgarian village of Krivina) was founded in the early fourth century as a military station, and acquired the character of a civilian settlement, with more diverse types of structures and ceramic types, during its peak period of occupation (c. 370–420). The Hunnic invasion of 422 destroyed the site, and after its recovery at the end of the fifth century the settlement was smaller and simpler. Nevertheless, a basilica was built during the sixth century, before the site was abandoned by the Byzantines soon after A.D. 600. Contexts of the eighth and ninth centuries suggest that the Slavic infiltration was slow and peaceful (typical Slavic ceramics co-existing with provincial Byzantine types), while eleventh century coins and other finds attest to the reappearance of Byzantines in the area.²¹ Excavations on the site between 1958 and 1981 covered an area of about 0.6 ha, (equating to 25% of the settlement’s total occupied area)²² and brought to light a variety of amphorae, spanning the period from the fourth to the tenth/eleventh centuries.²³ The late antique amphora types included five of Riley’s amphora ‘package’ (Böttger’s typology in brackets): LR1 (type II.1), LR2 (type I.1), LR8 (type III.1), LR3 and LR4 (both listed as ‘Typ II Varia’). The tabulated results on the amphora finds²⁴ indicate that LR1 and LR2 were the most popular amphorae on the site, with LR2 numerically dominant, especially during the first half of the fifth century when the volume of amphora imports reaching the site seems to have peaked. However, both types seem to slowly disappear towards the end of the seventh century, at which date they most probably only represent residual material.²⁵ LR8, LR3 and LR4 are poorly represented.

The early Byzantine city of Nicopolis ad Istrum was established c. A.D. 450 to the south of its Roman forerunner after the latter had been destroyed by fire, probably when sacked by the Huns in 447. The new city was, in turn, abandoned at the end of

the sixth or at the beginning of the seventh century, when Byzantine hegemony over the lower Danube was finally lost to the Slavs and Bulgars.²⁶ The main body of ceramic material, excavated in fourteen separate areas of the city (including fortification areas, towers and churches), covered the general period of occupation from c. A.D. 450 to 600, but earlier material was also recorded.²⁷ Out of a total of approximately 100,000 sherds found in well-stratified levels, an estimated 4,000 belong to amphorae.²⁸ Falkner, the site pottery specialist, distinguished thirty-two different amphora wares. Amongst these, a long cylindrical-bodied amphora of North African origin (Falkner's ware no. 37: P/W Class 33) was numerically dominant. LR2 (Falkner's ware no. 94) was the best represented type of Riley's amphora 'package'. Other well-known Roman amphora types from the site include Benghazi Type MRA 7 of probable Aegean origin (Falkner's ware no. 96), LR1 (Falkner's ware no. 164) and Palestinian types (Falkner's ware no. 76, which includes both barrel-shaped and elongated LR4 variants). The majority of the remaining material mainly comprises unfamiliar wares and forms (but ware no. 19 is assigned a Tunisian provenance, and ware no. 167 is probably related to LR3).²⁹ A series of graphs in the site publication show that in the period spanning A.D. 350–450 MRA 7 was dominant, followed by P/W Class 33 and then LR2 (30%, 28% and 18%, respectively); between A.D. 450 and 600, LR2 decreases in volume (14% of all amphorae), while the other two main imports increase, to each comprise 34% of the total amphora assemblage.³⁰ Data for ware no. 164 (LR1) are not available in a graph format, but according to Appendix 2 in the site publication, where pottery from twenty dated contexts is presented by type and ware, LR1 does seem to co-exist with LR2 at Nicopolis from A.D. 350–600 (although it is far less common than the other three amphora types).³¹

Systematic excavations from 1936 to 1964 at the site of Sucidava (*Sykibida* in Procopius), situated 3 km west of modern Corabia on the north bank of the Danube, have brought to light the remains of a fortified civilian settlement of 25 ha and, at a distance of only 100 m to the south-east, the remains of a separate citadel measuring about 2 ha.³² The civilian settlement evolved on the site of a Roman garrison at the end of the second century, or the beginning of the third century A.D., while the citadel was built by Constantine the Great (324–337); a stone bridge connecting the citadel with Palatiolon (ancient Oescus), on the other side of the Danube, was constructed simultaneously. The coins found at Sucidava show an uninterrupted series from Aurelian (270–275) to Theodosios II (408–450). In the mid-fifth century (A.D. 442 or 447), the site suffered from attacks by the Huns, but was again restored, probably under Justin I (518–527) or by Justinian I (527–565). On the basis of the numismatic profile, the Byzantine garrison seems to have departed from Sucidava around A.D. 600. Scorpan briefly refers to the amphorae found at Sucidava in his monograph on the site, where the illustrated examples include well-known types (LR1–4).³³ Although no quantified data are available, Scorpan classified the amphorae into two groups. The first contains the slender LR8, and the second amphorae with 'ribbed' bodies (i.e. LR1, LR5 and a peculiar amphora, which looks like a squat offspring of LR1). Scorpan notes that the amphorae from the second group are more numerous at Sucidava. Taking into account that LR5 are generally rare in the Danubian provinces, Scorpan's observation must, most probably, refer to LR1. Scorpan also observed that the amphorae with

dipinti (and we may assume from the context of his manuscript that these are LR1 and LR8) are imports and, even more noteworthy, that their distribution is very limited and does not extend beyond the walls of the citadel (i.e. the quarters of the military garrison). By contrast, neither the civilian settlement, nor its surrounding area have yielded any amphorae bearing *dipinti*.

A significant number of late antique amphorae were discovered during the 1936–1937 excavations at the fortified hill-top site of Golemanovo Kale, in the area of Sadovec in North Bulgaria. By the time of its publication, two-thirds of the original material had been lost.³⁴ Among the preserved amphora from the site LR1, LR2 and LR8 are best represented (six, seven and twenty-one diagnostic fragments respectively are included in the published catalogue).³⁵ The only *terminus ante quem* for these amphorae is supplied by the coin evidence, which indicates that occupation at Golemanovo Kale came to an end in, or soon after, A.D. 584.³⁶

LR2 have been also recorded at Novae (modern Svishtov, 50 km north of Nicopolis ad Istrum),³⁷ and at Pernik;³⁸ no quantified data, however, are yet available for either site.

Although LR2 are particularly frequent on Rumanian sites, especially in the Dobroudja region,³⁹ our understanding of amphora consumption patterns in the area is impeded by the near-absence of quantified data and evidence about local kilns and their output.⁴⁰ A systematic study of late antique kilns in Dobrudja, as well as of quantified pottery assemblages like the results that have emerged in the 1990s at sites such as Tropaichoi and Independenta, are needed before late antique exchange patterns in this region can be assessed more formally.

Sacidava (*Skedevà* in Procopius, modern Musait in south-west Dobrudja) was a Roman fort erected at the end of the third century on the south bank of the Danube, between Dorostolon and Axiopolis. Excavations on the hill above Musait have revealed a modest-sized fortress reinforced with rectangular towers. Coins from between the reigns of Aurelian (A.D. 270–275) and Theodosius II (408–450) are numerous (over 150 examples), whereas none from the second half of the fifth century have been recorded, and only ten from between the reigns of Anastasius I (491–518) and Maurice (582–602).⁴¹ In the 1969–1971 excavation report Scorpan suggested that life on the site continued, albeit in a limited form, during the first half of the seventh century and that Sacidava was gradually abandoned in the course of the second half of the seventh century. The same report includes a brief list and a few illustrations of typical pottery finds from the site, including an LR1 and an LR2, both dated by Scorpan to the sixth century.⁴² Scorpan dealt with the pottery from Sacidava in greater depth in a subsequent article in 1975,⁴³ where he classified the site's amphorae into thirteen types, compared them (when possible) with similar finds from other sites in the Dobroudja area, and commented on how common each type was in each century. Unfortunately, Scorpan's quantitative methods leave much to be desired. However, in view of the absence of superior information, we must attach some value to his firm observation that LR1 examples are well-represented and that LR2 are most numerous among the thirteen amphora types excavated.

Dinogetia (modern Garvan), a city and stronghold along the *limes* in Scythia Minor, is located on a small island in the Danube. Excavation results have identified two main phases of occupation: a late antique one (fourth-to-sixth century), when a rectangular

fortress was built on a rocky outcrop (excavations have revealed a main street 4–5 m wide and official buildings such as the *praetorium*, baths, and a basilica), and a middle Byzantine one (tenth-to-twelfth centuries).⁴⁴ The late antique fortress was partly burnt down, probably during the Cotrigur attack of 559,⁴⁵ and was deserted c. 600. Unfortunately, no study of the site's late antique pottery has been published, and our only information about amphorae occurs in the 1966 report, which summarises the excavation results from the east part of the north-west sector of the fortress.⁴⁶ The eleven excavated rooms served as storehouses for cereals and other provisions, as the numerous *pithoi*, amphora fragments and millstones found indicate. No quantitative data are available, but one is left with the impression that LR2 sherds were common: one fragmentary example was found between Towers 9 and 10 next to fragments of a millstone, and more LR2 sherds came from Room IIIA, Room VII (which also housed four large *pithoi*, and two millstones – one unfinished), Room IX (sherds from three vessels), and from the road running past the *praetorium* in front of room VII. Apart from LR2, LR3 seems to be the only other late antique amphora type from Riley's 'package' present at Dinogetia. The year A.D. 559, when almost the entire city was reduced to ashes, provides a *terminus ante quem* for these finds.

The ancient name of a site which lies 2.5 km east of the modern village of Independenta (Murighiol) in Dobrudja, on the south bank of the lower Danube, is not known, but both Halmyris (*It. Ant.* 226.4) and Gratiana (*Proc. De aed.* 4.11) have been suggested.⁴⁷ Of the three phases identified during the 1981–83 and 1985–6 excavations (dating from the fourth century B.C. to the third decade of the seventh century A.D.), amphorae proved most numerous and varied in the late antique phase when the site was occupied by a fort (48% of all pottery and about thirty-three types). Well-known amphorae include types LR1–LR4. Amongst these, LR1 and LR2 were consistently most highly represented.⁴⁸ LR2 appears on the site for the first time in the first half of the fourth century, which is slightly earlier than when LR1 appears in smaller quantities in the second half of the fourth century. From then, until the beginning of the seventh century, the two types are constantly present, with LR2 generally numerically dominant.

The 1979–1983 excavations at the late Roman fort at Topraichoi (the first one of its type to be systematically investigated in Dobrudja), uncovered an abundance of archaeological material, including about 2,000 coins, which enabled a firm site chronology to be established.⁴⁹ The fort was built between A.D. 369 and 372, as part of a more extensive effort to strengthen the frontiers along the Danube and Rhine. Archaeological evidence has shown that during the first fifty years of its existence (roughly from 370–420) the *burgus* of Topraichoi was predominantly military in nature: the small garrison apparently fulfilled the task of guarding and supervising a natural cross-roads for terrestrial communication (the pottery from this phase was unimpressive, both in quantity and diversity, although it is striking that weaponry was numerous). During the next fifty years or so, roughly from 420 until its destruction at some point in the second half of the fifth century, it seems that the *burgus* no longer sheltered a garrison and that occupation acquired an exclusively civilian nature. The majority of the pottery and tools from the site (millstones, fishing-net weights, reaping hooks, scythes), as well as a large storehouse, relate to this second phase, when

weaponry was less numerous. Based on the above evidence, the site's excavators suggested that from about A.D. 420 onwards, as it gradually lost its exclusive military character, the *burgus* served as a storehouse for the local military *annona*, and its purpose was to guarantee the availability of supplies for troops. Although I am not aware of a specific publication on amphora finds from Tropaichioi, a useful impression of the excavated quantities of LR1 and LR2 (which seem to be the predominant types), is provided by a histogram of comparative assemblages published by Opait in his article on the pottery from Independenta.⁵⁰ This shows both types co-existing at Topraichioi from the second half of the fourth century up to the end of the *burgus'* life. During the second half of the fourth century LR2 significantly outnumbers LR1 (about 17.5% compared to 4.5%), but during the next fifty years LR1 levels increase and take a slight precedence over LR2 (17% and 15% respectively).

Histria was a Greek colony on Lake Sinoe, north of Constanza. The city prospered between the fourth and sixth centuries, when its ramparts were rebuilt three times (some bricks in the fortifications bear stamps of Anastasius I). Excavations have uncovered a commercial district containing various workshops, private dwellings, and several public buildings, including a sixth century basilica. The settlement's prosperity had come to an end by c. 580, as the very humble houses from the latest phase indicate. The numerous coins of Maurice (582–602) on the site can be related to this emperor's attempt to protect the area against Avar attacks; the number of Byzantine coins decreases thereafter and cease to be deposited after the reign of Heraclius.⁵¹ I am unaware of any publication devoted to the systematic presentation and analysis of pottery from Histria. For the purposes of this paper, we can mention the illustrated examples of LR1, LR2 and LR4 (one example each) in the 1961 report of the excavation of the sixth-to-seventh century layers in two rooms of unidentified function in the central sector of the city (Building D6: Rooms C and D),⁵² and two probable fragments of LR2 mouths (one dated to the fifth century) illustrated amongst the finds from the excavation of the two Roman baths.⁵³ The catalogue of amphora finds from the latter consists of a simple list of diagnostic fragments, which are neither identified, nor quantified. Thus, no safe conclusions can be drawn about the types and frequency of late antique amphorae from this excavation.

A large group of LR2 (the second largest concentration of these amphorae after the Yassi Ada shipwreck discussed below) were discovered at Tomis, modern Constanza, on the west coast of the Black Sea. During Late Antiquity Tomis was the civil and ecclesiastical metropolis of the province of Scythia Minor and two large fifth-to-sixth century basilicas have been excavated in the city. Justinian I rebuilt the fortifications and the city withstood a siege by the Avars in 599. Thereafter, its history is obscure for some centuries, but in the tenth century Konstantia is referred to as a station on the shipping route of Rus' to Constantinople.⁵⁴ The LR2 were discovered during the 1965–1968 excavation of the substructure of the so-called 'Edifice with Floor Mosaics', situated to the west of the modern port. The substructure consists of eleven vaulted rooms. Room nos. 3 and 4 contained iron anchors, lamps, weights, and amphorae (mainly about 120 LR2), which according to the results of chemical analysis were filled with Somalian olibanum, turpentine, Arabian myrrh, pine-resins, mastic from Chios, and pigments. Additional recycled LR4 amphorae contained iron nails.⁵⁵ These finds,

today stored at the Constanza museum, indicate that the vaulted rooms served as a chandlery. All the LR2 found in the 'Edifice' bear *graffiti*, which combine the Latin numbers X and I, and *dipinti* in Greek letters. Radulescu has suggested that the former numbers refer to the conventional capacity of the vessel, while the Greek ones reflect the real quantity within each vessel. The *dipinti* are interpreted as control marks placed on the vessels when they passed through customs. The diversity and peculiarity of the LR2 contents at Tomis, as well as the fact that they bear more than one Greek *dipinti*, makes it almost certain that these amphorae had been reused.

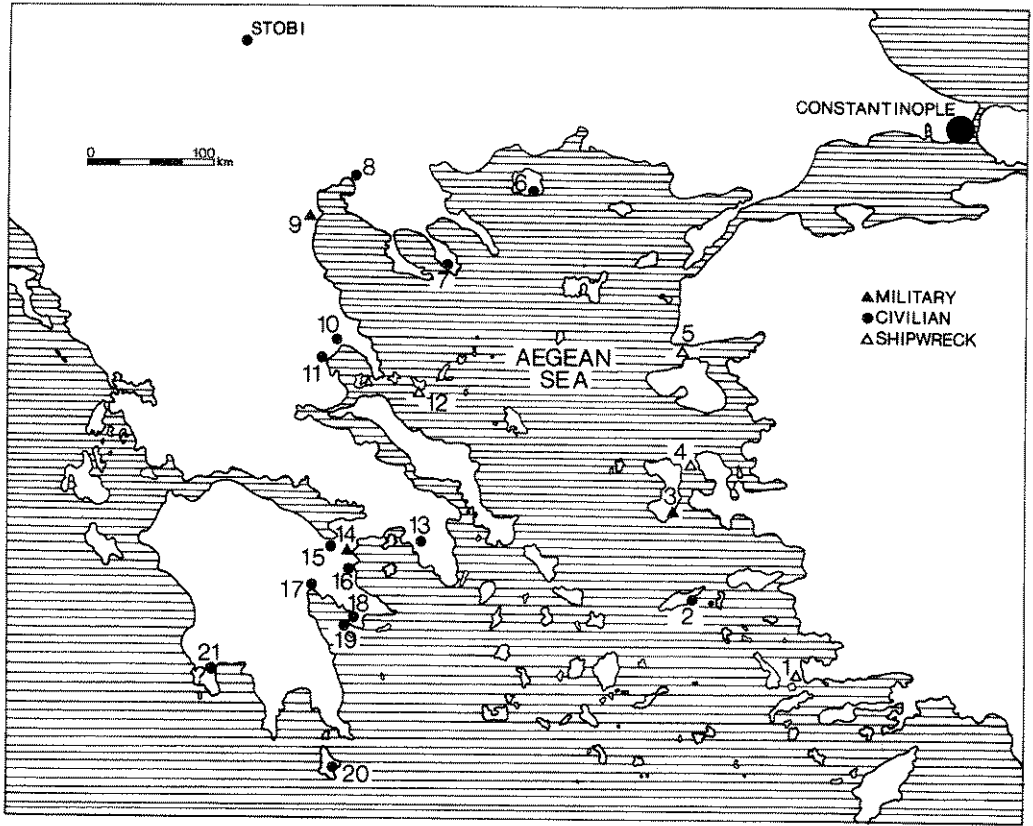
The last site within the North Balkans where LR2 have also been recorded is Tropaeum Traiani (modern Cetatea). At least one LR2 (together with an LR1) is illustrated in the excavation report, but is not identified as such in the pottery catalogue.⁵⁶ No other well-known amphora types are included in this publication, and no quantified data are presented.

C. The Aegean (Fig. 7.3)

The LR2 seems to be equally important in the Aegean Sea region, and the quantified pottery data that have started to appear within the archaeological literature during the last twenty or so years enables the importance of this amphora type in the area to be re-evaluated.

The largest concentration of LR2 so far recorded comes from the Yassi Ada shipwreck, located near one of several islands bordering the Chuka Channel in the south-eastern Aegean Sea. After the 1961–1964 excavation and the additional 1980 investigation, the total number of transport vessels found on the shipwreck amounted to 822, of which 103 (16%) were LR1 and 719 (85%) LR2.⁵⁷ The importance of the Yassi Ada shipwreck is that it constitutes a 'closed' archaeological site, which can be dated accurately thanks to the coins on-board. The dates and the mint distribution of these coins (fifty-four copper and sixteen gold ones) provide a *terminus post quem* of the sixteenth year of Heraclius' reign in 625/6 for the date when the ship sunk, and indicate that its main area of operation was the North Aegean.⁵⁸

The detailed study of a much larger sample of LR2 from the Yassi Ada shipwreck in 1989 (460 vessels in total) led to significant new conclusions. First of all, it was observed that 80% of them shared very similar fabrics and thus formed a relatively homogenous group, which, on the basis of variations in dimensions and decoration, could be divided into four major sub-types (I-IV).⁵⁹ The 130 vessels of sub-type I, in particular, were remarkably uniform in form and dimension,⁶⁰ indicating a certain standardisation that proved that the previously stated "lack of standard sizes among the amphorae of the Yassi Ada", had been distorted by a lumping together of different amphora forms. The remaining 20% of the LR2 belonged to about forty secondary sub-types, mostly only represented by one example. The amphorae in roughly half of these secondary sub-types and those of the four major sub-types (I-IV), all had very similar fabrics, which was seen as an indication of derivation from a single primary production region. At the same time, however, about twelve to fourteen distinctly different fabrics were observed amongst the remaining amphorae from the secondary sub-types, and this was regarded as evidence that the LR2 under transport were manufactured in a number of other production centres as well.



East Aegean Coast	North Aegean Coast	West Aegean Coast
1. Yassi Ada*	6. Thasos*	9. Louloudies*
2. Samos*	7. Torone*	10. Demetrias
3. Chios-Emporio	8. Thessalonica	11. Thebes
4. Prasso Islets		12. Skopelos
5. Methymna		13. Athens
		14. Isthmia
		15. Corinth
		16. Kenchreai
		17. Argos*
		18. Halieis
		19. Chinitza Island
		20. Kythera
		21. Nichoria

* Quantified data available

Fig. 7.3: Map of archaeological sites in the Aegean discussed in the text. (Drawing: S. Kingsley).

Should we accept the theory that the varied collection of secondary LR2 sub-types originated from kilns of limited output? Not quite. We believe, on the basis of morphological characteristics, that some of the secondary sub-types are much earlier in date than those of the four major sub-types;⁶¹ it is unfortunate that none of the illustrated examples preserve their bases, as the presence or absence of a basal knob would help date these amphorae more firmly to before, or after, the middle of the sixth century. On the other hand, all of the illustrated amphorae of the four major subtypes (thought to be of a later date and coming from a single production centre) do indeed have rounded bases. Thus, it may also be possible that the earlier LR2 examples on the Yassi Ada ship were simply the remnant of former cargoes, most of which had broken or been dispersed during their lengthy period of reuse. As a result, their presence on the Yassi Ada ship does not necessarily imply that numerous LR2 workshops were in operation at the time when the ship sunk.

Many LR2 amphorae were found during the 1980s excavations of the German Archaeological Institute in the ancient city of Samos. They were recovered from the tunnel of Efpalinos, from two cisterns situated about 30 m east of the south entrance of the tunnel, and from the ecclesiastical complex that was built during the second half of the sixth century over the ruins of the Roman baths. More LR2 vessels were found in a pit deposit situated to the east of the ecclesiastical complex, which was excavated in 1982 by the Greek Archaeological Service.

The Efpalinos tunnel, a construction of the second half of the sixth century B.C., was used twice as a refuge by the inhabitants of Samos: once during the Persian presence in the Aegean in the 620s, and then in the third quarter of the seventh century, when the island may have been briefly occupied by the Arabs. Use of the tunnel as a hiding-place during those years is confirmed by coin finds, mainly issues of Heraclius and Constans II, and by the discovery of an immense quantity of pottery (5–6 tons of amphorae, *stamnoi*, *pithoi*, etc.) apparently used by the frightened people of Samos for the storage of essential foodstuffs such as oil, wheat, and salt. Hautumm studied the amphorae from the Efpalinos tunnel and published a lengthy study of five of the types present.⁶² These consisted of (with Hautumm's identification of provenance and content in brackets): LR1 (an Egyptian wheat amphora), LR2 (an olive oil amphora), LR3 (an Egyptian vessel for liquids), P/W Class 35 (cylindrical wheat amphorae from North Africa), and LR8 (the *spatheion*). In his study, Hautumm attached particular emphasis to the form, origin, content, distribution and date range of each type. Little attention was paid to quantification, but in certain instances some useful comments were included.⁶³ It is clearly stated, for example, that LR2 are "am häufigsten vertreten" and that about 430 examples could be reconstructed, although the original total number within both the Efpalinos tunnel and the cisterns must have comprised at least 500–600 vessels. Quantities of P/W Class 35 amphorae in the Efpalinos tunnel were estimated at a couple of hundred, while only three to four dozen LR8 were apparently present. No hint is offered about the frequency of LR1 and LR3.

After the Roman baths collapsed during an earthquake in the mid-fourth century, an ecclesiastical complex was constructed over them during the reign of Justin II (565–578).⁶⁴ The excavations indicate that this was comprehensively destroyed in the first quarter of the seventh century, then rebuilt shortly afterwards, before suffering final

destruction during the Arab invasion in the third quarter of the seventh century. The complex consisted of two distinct areas. To the north, occupying what was originally the north portico of the Roman baths, was a three-aisled basilica with an ambo, atrium and baptistery. To the south was a domestic complex comprising a treading area, alongside a lever-and-weights press and collecting basins to the west; warehouses used to store agricultural produce were located to the east. One of these storerooms contained twenty LR2, each of 30 lt capacity (and as at Iatrus, a millstone was found next to this concentration). In the adjoining room were 120 LR1 amphorae, each of 8 lt capacity.

Amongst other finds, the pit deposit to the east of the ecclesiastical complex contained an abundance of pottery (transport vessels, kitchen- and table-wares). Amphorae comprised the most numerous group and included two LR1, six LR2, ten of the so-called 'Samos Cistern Type' vessel, and two LR8.⁶⁵ The latest dated coin amongst the fifteen bronze coins found in the pit is a half-*folles* of the Emperor Heraclius from A.D. 615–629. The coin evidence, and the proximity of the pit to the ecclesiastical complex, suggested that the artifacts were thrown into it when the ecclesiastical complex was cleared and repaired after its destruction in the first quarter of the seventh century.

Another interesting amphora assemblage was uncovered during the 1952–1955 British excavation of the fortress on the acropolis at Emporio, on Chios. The fortress was constructed during the reign of Heraclius (A.D. 640–641), or more likely under Constans II (641–668), in response to the Arab threat in the Aegean. By the end of the third quarter of the seventh century (most probably before 673/4), however, the Arabs had managed to destroy it.⁶⁶ Quantified data on the fort's amphorae are not available, but the excavators state specifically that LR2 was "the commonest type from the fortress floor". Four examples are illustrated in the site report; other well-known types illustrated include P/W Class 35 (two examples), LR1, LR4 and LR5 (one example each). An isolated and fragmentary LR2, probably belonging to the earlier variant (as indicated by the mouth profile) has been found in the sea near the Prasso islets to the north-east of Chios.⁶⁷

The pottery assemblage from Thasos published in 1992 includes material excavated from the Double Basilica at Aliko (between 1969 and 1977), a villa (1972), as well as material uncovered during the old *École Française d'Athènes* excavations mainly from the Agora area. The quantified amphora statistics clearly shows that LR1 has a distinct precedence over all other types (56%). LR2 comprises 27% of the assemblage, followed by LR3, and Palestinian imports (10% and 7%).⁶⁸

Torone is situated on the west coast of the Sithonia peninsula in Chalkidike and is one of the few all-weather anchorages along the entire Thracian coastline. Excavations conducted there since 1975 have concentrated on the Isthmus and Lower City, and a late antique cemetery has been investigated on Terrace IV between Promontories 1 and 2.⁶⁹ Coins of Constantine I indicate that the latter was first used in the first half of the fourth century. Some burials, almost exclusively of infants, had been placed in amphorae, a fact that proved instrumental in establishing an on-site typology. The first published pottery report illustrates the seven types of amphorae – all imported – present at Torone.⁷⁰ Quantified data, however, are only available for material from the

Isthmus and Lower City⁷¹ (the cemetery will be discussed in a forthcoming volume). The range of amphora types currently identified include LR1–LR4, and P/W Class 34, of which LR2 has an overall precedence (53% compared to LR1 37%, LR3 6%, LR4 4% and P/W Class 34 less than 1%). The morphological characteristics of the two illustrated LR2 examples suggest a date preceding the mid-sixth century.

It is most frustrating that the amphora-based study of economic trends in the late antique North Aegean is limited to Thasos and Torone. The obvious void created by the absence of comparable information from Thessalonica, the most important regional port city and the second most important city in the Empire from the seventh century onwards, is hard to ignore. Amphora sherds have been recorded sporadically during rescue excavations,⁷² but an extensive study of all material from the city is urgently needed to further illuminate the crucial role that Thessalonica undoubtedly played in the late antique Balkan economy.

LR2 amphorae were relatively abundant within the pottery assemblage retrieved during the 1995 field survey of an area of about 17 ha at the site of Louloudies, situated 10 km north-east of Katerini and 3 km north of the village of Korinos in Pieria. Rescue excavations have uncovered a small sixth century fortress (*quadriburgium*) enclosing a Christian basilica, a house (*megaron*), and ancillary structures, while the 1995 geophysical survey identified another sixth century fort about 160 m to the south.⁷³ A total of 76 kg of pottery was collected during field-walking. Four of Riley's amphora 'package' were present within the survey assemblage, which was dominated by LR1 and LR2 vessels in almost equal percentages.⁷⁴ Without complementary excavation, the validity of this information may be questionable.

LR2 seem to have been highly popular in the two Thessalian port cities of Demetrias and Thebes. Rim fragments were retrieved during the excavation of the atrium in the Basilica of Damokratia at the former city.⁷⁵ None of the amphorae have been classified or quantified, although associated coins date the deposit to the second half of the fourth century. Two well-preserved LR2 vessels are illustrated in the 1976 report on rescue excavations at the late antique city of Thessalian Thebes (modern Nea Anchialos),⁷⁶ and A. Ntina, the current excavations' supervisor, has kindly informed me that this type is very common. The examples published in 1976 came from an unidentified late antique building complex situated very close to the city Cathedral (Basilica C), which, based on the coin evidence, seems to have been abandoned towards the end of the sixth century.

The only other LR2 amphora from Thessaly, as far as I am aware, is an unpublished example which today stands in isolation in the yard of the Episkopi church on the island of Skopelos.⁷⁷ The shell encrusted surface of the vessel indicates that it was once part of a ship's cargo, which must have sunk nearby. Indeed, the maritime sea-lane leading through the Sporades islands (south of Skiathos and Skopelos, and then through the pass between Alonnesos and Peristera) was well-used by sea-craft travelling between the eastern coast of Thessaly and either Constantinople or the western coast of Asia Minor, as is confirmed by the numerous shipwrecks in the area.⁷⁸

In Athens, LR2 (together with LR3, LR5, and P/W Class 47) have been recorded in the Agora,⁷⁹ but the nature of their publication prevents conclusions being drawn about relative quantities. An LR2 amphora is illustrated in the report of the 1957–1958

University of Chicago excavations at Isthmia.⁸⁰ This was one of several transport and storage vessels which were reconstructed from the prodigious quantities of coarse pottery found in Tower 7 of the Justinianic fortress. A well-preserved group of unpublished LR2 (probably from the site's excavations) are stored in the museum of Isthmia.⁸¹

Corinth, the late antique capital of the province of Achaia, is situated on the isthmus of Corinth in the north-east Peloponnese in a location of strategic and commercial importance. The city undoubtedly enjoyed a leading role in the economy of the Aegean world, due to the volume of trade that took place within its two harbours: Lechaion on the gulf of Corinth, and Kenchreai on the Saronic gulf. Without a synthesis of the amphorae uncovered during the systematic and extensive excavations of the city, its cosmopolitan and enterprising character must remain undefined. We can simply refer to a couple of LR2 vessels recorded by the American School of Classical Studies at Athens in the area south-west of the forum and east of the city's theatre,⁸² and note the absence of the type in the publication of the Roman pottery excavated between 1961–1975 from the Sanctuary of Demetre and Kore on the slopes of the Acrocorinth.⁸³ This absence, however, is explicable by the fact that the pottery does not post-date the early fourth century. LR2 finds were also recovered recently during the rescue excavation of a late Roman bath south-west of the Roman Forum, in the Panayia Field.⁸⁴ The bath was built at the end of the fifth century, or during the first half of the sixth century, and seems to have been abandoned by the end of the sixth or early seventh century. The publication of this site is exemplary inasmuch as a detailed description and quantification of stratified pottery is provided. The amphora sample, albeit small, includes four well-known late antique types: LR1 (ten fragments), LR2 (twenty-seven sherds), LR4 (twenty-four fragments), and LR5 (three sherds).

Material relevant to our discussion was also found during the 1963–66 and 1968 excavations of Kenchreai, the eastern port of Corinth. The objective of this project was to investigate the city's late harbour, which was developed after the re-founding of Corinth in 44/3 B.C. in a cove to the east of the original harbour mouth. This anchorage was artificially developed by the construction of moles, warehouses, a stoa, and other storage and shop facilities, and by the redevelopment of the sanctuary of Aphrodite and the construction of a sanctuary of Isis. All these facilities continued to be adapted and used throughout the Roman period and into the fourth century. A rapid decline occurred soon after, except in the sanctuary of Isis which was succeeded by a church used into the sixth century. Adamsheck, who published Kenchreai's pottery,⁸⁵ observed that it primarily reflects the harbour area's Roman occupation and is a problematic sample because most of the site's strata had been greatly disturbed; (only a few deposits, like the destruction debris in the Temple of Isis, formed during the earthquake of A.D. 375, showed coherence). Thus, the Kenchreai pottery report can only be used as a broad index of representative, but mainly poorly dated, amphora types. Well-known types present included LR1, LR2 and P/W Class 47. An almost intact LR2 example with a tall, conical neck, thick and outwardly-flaring rim, and a basal knob was recovered from the destruction debris of the Isis sanctuary and thus pre-dates A.D. 375.⁸⁶

Abadie has made interesting observations on amphora types and quantities at Argos in her “*esquisse d’un travail qui n’est pas terminé et qui est donc susceptible d’être affiné par la suite*”, where she studied amphora material from about thirty trenches.⁸⁷ All of Riley’s ‘package’ is present at Argos (LR1–LR5 and LR8). LR2 first appears cautiously in the fifth century, but dominates in the following century, when it accounts for 28% of all amphorae, as compared to 21% for LR1 (the second most popular amphora type at sixth century Argos). None of the remaining types from Riley’s ‘package’ exceeds 10% in the sixth century.

A remarkable concentration of LR2 fragments was discovered at ancient Halieis (opposite the modern village of Porto Cheli in southern Argolis), at the mouth of the Argolic gulf. Excavations conducted in the 1960s and 1970s revealed extensive architectural remains of the Classical and Early Hellenistic city (including at least five, and perhaps eight, olive oil press installations in fourth century B.C. houses), which was probably abandoned in the early third century B.C.⁸⁸ During Late Antiquity the central area of the Classical town was reoccupied, and the settlement’s prosperity peaked during the second half of the sixth century. The name of this new settlement is unknown from historical sources. Other than a bath and about twenty graves scattered around the site’s nucleus (dug inside rooms of Classical houses), no other architecture has been uncovered.⁸⁹

The settlement is characterised by a striking abundance of pottery, especially amphorae. All vessels, except one probable late Roman North African P/W Class 35 amphora – used for a child’s burial – belonged to the LR2 type (twelve out of the thirteen fragments published by Rudolf).⁹⁰ Both principal forms of this amphora type were attested, although the later form with a plain or short base was more common. No *dipinti* or other inscriptions were recorded. Three amphora stands were recovered, used either during the production process or perhaps when the vessels were filled before transport. The large quantity of material dumped around the site, and the discovery of a large heap of what appears to be refined clay near a furnace, indicate that a main occupation of the inhabitants of late antique Halieis was pottery production, with a certain specialisation of amphorae, apparently of LR2 type.

The area surrounding Halieis is rich in clay, which would have been suitable as raw material, and two late antique kilns were briefly reported from the vicinity by the Argolid Exploration Project in 1979 (Site B19) opposite Kounoupi island, between Ermioni and Porto Cheli.⁹¹ In 1985, the Stanford Southern Argolid Survey reported wasters and at least one pottery kiln from the same site and identified the sherds produced there as belonging to LR2 amphorae.⁹² The discovery of an unpublished shipwreck containing LR2 at a depth of 4–7 m in the vicinity of Porto Cheli (Cheliou port) furnishes complementary evidence that this local product was linked into wider inter-regional exchange.⁹³ Finally, three fragments of LR2 were found with early seventh century coins on the island of Chinitza, located about 1 km opposite Porto Cheli. Optical emission spectroscopy conducted by the Fitch Laboratory confirmed that they most probably originated from the Halieis kilns.⁹⁴

Finally, in the east of the Peloponnese, isolated examples of LR2 have been reported on the island of Kythera⁹⁵ and on the site of Nichoria in Messenia (south-west Peloponnese).⁹⁶

Conclusions

A. LR2 Frequency and Content

One key observation requires emphasis following the present overview of the amphora evidence presented from the Balkan and Aegean sites: LR2, which “is widespread throughout the Mediterranean [but] does not appear to have been the predominant amphora on any site so far published”,⁹⁷ has now been identified as the predominant transport vessel for the first time on a number of sites, which, apart from the much discussed Yassi Ada shipwreck, include Iatrus, Independenta, Sacidava, Samos, Chios, Torone, Argos, and Halieis. The same is probably also true for Dinogetia, Topraichioi and perhaps Nea Anchialos. Alongside these sites, LR2 also follows closely behind LR1 numerically at Viminacium and Louloudies. Both types are closely related on most sites (Iatrus, Independenta, Sacidava, the Yassi Ada shipwreck, Torone, Samos and Argos). The abundance of LR2, and relative dominance of LR1 and LR2 in similar percentages on most Balkan and Aegean sites, seems to reflect agricultural specialisation and a distinct market orientation.

Both wine and olive oil have been suggested as the main products transported in both vessels, without definitively linking either type to one specific product (but see Decker, Chapter 4). Hautumm has drawn attention to the greasy interior surface of numerous LR2 jars found near the Efpalinos tunnel on Samos, which he interpreted as the residue of the olive oil they originally carried.⁹⁸ A strong piece of evidence in favour of olive oil as the prime content of LR2 is provided by the *dipinti* written on a group of eight published amphorae from North Balkan sites (two from Sucidava, two from Novae and four from Histria). These amphorae have been broadly dated, on paleographic grounds, to the sixth century and all *dipinti* on them contain the word *elaïou* (olive oil) or *glykelaïou* (sweet olive oil).⁹⁹ At the ecclesiastical complex at Samos, however, LR1 and LR2 were found in an area associated with both the production of wine and olive oil, which may suggest that these types were used for transporting both commodities (although the presence of the LR1 in a room directly connected to the wine press may be significant). Finally, inscriptions referring to the identity or quality of their contents were recorded on a number of LR2 from the Yassi Ada wreck.¹⁰⁰ Five amphorae bear the *graffito* ELE, which may be an abbreviation for *elaiai* (olives) or *elaion* (olive oil), and three other bear the *graffito* GLY, which is possibly an abbreviation for *glykys* (sweet [wine]). It is noteworthy that two amphorae with the *graffito* ELE did indeed contain eroded olive stones; regrettably, no organic contents were preserved in the amphorae inscribed with the *graffito* GLY. The hypothesis that wine and olives, or olive oil, were carried within the Yassi Ada LR2 cargo was further supported by the chemical analysis of the content of some sealed amphorae: a total of 1,380 grape seeds was found in sixty-nine vessels, some clearly pitched, while eroded olive stones were found in thirty-one examples, some also pitched. If nothing else, this evidence demonstrates that the clear-cut assumption that unlined amphorae carried olive oil, while pitch-lined ones carried wine, does not always reflect reality.¹⁰¹ Crucially though, the relevance of this set of data is questionable, because the cargo amphorae had evidently been re-used and filled with various produce several times before the fateful voyage.

Hautumm's argument, which in my view strongly favours olive oil or olives as the primary content of LR2, emphasises that while this amphora type is very common in the olive oil producing Aegean area and turns up in areas with limited or no olive cultivation (North Balkans, British Isles), it is uncommon in other olive oil producing areas of the Empire (Syria, North Africa, Spain), where the import of Aegean olive oil would have been superfluous.¹⁰² Indeed, the LR2 kilns identified in the vicinity of Halieis in the north-east Peloponnese occur in an area with a long tradition in olive cultivation throughout the centuries (the late antique evidence, in particular, includes numerous *mortaria* and *orbes* from *trapeta*).¹⁰³ One factor underlying such a concerted investment in olive cultivation and oil processing was the rich soils on the hillsides and valleys surrounding Halieis, which are ideal for olives but less suited to wheat cultivation.¹⁰⁴ Textual evidence, which clearly underlines the role of the Peloponnese as one of the main (but certainly not the only) olive oil producers in the Aegean, is of slightly later date: it is found in the works of Constantine Porphyrogenitus (who usually repeats information from earlier centuries), in tenth century hagiographical texts, and in the memoirs of an English traveller at the end of the twelfth or the early thirteenth century, who stated that no place in the whole world produced as much olive oil as the southern Peloponnese.¹⁰⁵

If we now turn to the areas which received LR2, for example Danubian sites, which are of special interest to this paper, we will observe that olive oil must have been a greatly demanded foodstuff, since it could not be supplied by local production. In the period between c. A.D. 250 and 450, Nicopolis ad Istrum seems to have been self-sufficient in wheat, barley, rye, pulses and partly in grapes.¹⁰⁶ At Iatrus, two *horrea*, dated to the second half of the fourth century, and a large processing installation containing at least twelve millstones, dated to the first half of the fifth century,¹⁰⁷ seem to imply that Iatrus was a major centre for the collection, processing and storage of grain during this period. Comparable evidence is known from the fourth century *quadriburgium* at Moesia, built at a strategic point where the river Porechka joins the Danube and located alongside granaries which were too large to have only supplied this small garrison.¹⁰⁸ Since both Iatrus and the *quadriburgium* on Porechka were situated at river mouths, we may assume that they both served as storage centres redistributing agricultural produce by ship to other garrisons along the Danubian *limes*. The development of local specialisation in agricultural goods has been linked with the personal initiative of the emperor Valens to improve the supply system to forts along the frontier lines; this phenomenon can be perceived in the *Codex Theodosianus*, which includes an edict of Valens relating specifically to the supply of wheat to the frontier forts (*C. Th.* VII.4.15).¹⁰⁹ Wine supplies may also have been partially procured from local sources in the Danube: its production, albeit of low quality, is proven by the discovery of calcinated grape pips and scales from Iatrus¹¹⁰ and Nicopolis ad Istrum, where vineyards were most probably introduced when the city was founded c. A.D. 110.¹¹¹ Further to the south, however, the one grape pip encountered at Stobi during botanical analysis is hardly indicative of widespread local viticulture (modern grape cultivation in the Vardar valley has only proved possible by using sophisticated irrigation). Finally, climatic factors, particularly cold winters, prevented olive cultivation and forced oil to be imported. Today, the olive-growing areas are located much further south in Macedonia and on the Adriatic.



Fig. 7.4: Nea Achialos (Thessalian Thebes). LR2 from a sixth century context (with lid) (from Iatridou, 1976: pl. 139c).

ing, breakable lids would have been functionally inefficient, their purpose is puzzling. Böttger ingeniously attempted to resolve this issue by arguing that the lids were inserted *inside* the amphora's mouth; the 'handle' projected downwards and was held in place with wax, resin or some other perishable material. This idea may be supported by the unusually rough surface of the handle and the correspondingly deliberately smoothed flat under-side of the lid (which would have been visible, according to Böttger). Although possibly valid, this idea surely requires confirmation by the discovery of complete LR2 examples sealed in this manner.¹¹⁴ However, the lids could easily have been used conventionally if we accept that they rested on the narrowest point of the funnel-shaped mouth; this system would have enabled the protruding handle to be 'guarded' by the tall mouth. Another possibility is that these lids travelled separately alongside the amphorae, and were only used once the amphora had been unsealed.

Most significantly, the association of LR2 amphorae with lids may indicate that their prime content was a substance not affected by the absence of air-tight conditions. This almost certainly excludes wine, which had to be consumed relatively quickly after the amphora's seal was broken. This fact may also explain the difference in capacity between LR1 and LR2 containers: the capacity of the latter is mainly about 40 litres, while the former holds about 15 litres on average.¹¹⁵ This basic difference is clearly evident within the ecclesiastical complex on Samos where the twenty LR2 each had a

Archaeological evidence, in the form of amphora finds of Hellenistic, Roman and late Roman date, indicate that even Stobi relied on trade with the West and the Aegean in order to provide its olive oil and (to a lesser extent) wine consumption needs.¹¹²

Finally, I believe that some morphological attributes of the LR2 amphora support the theory that olive oil was its prime content. LR2 seems to be the only known amphora type manufactured with matching lids: these have small rims, protruding handles, and were fired in the typical LR2 fabric. Complete examples have been found at Saraçhane, Stobi, Iatrus and Nea Anchialos (Fig. 7.4),¹¹³ and in all cases seem to be associated with the earlier form with a pronounced conical neck and funnel-shaped mouth. Since the long-distance transport of vessels with protrud-

capacity of 30 litres and the 120 LR1 each contained 8 litres. The detrimental impact of oxygen on the flavour and body of the wine, and conversely olive oil's relative long 'shelf-life', may have conditioned differences in metrology. Thus, while the wine-carrying LR1 had to be emptied fairly soon once opened, the olive oil carrying LR2 (with lids facilitating multiple takings of olive oil) could serve longer as storage vessels.

Another characteristic of the LR2, which is perhaps related to content, is the shape of its mouth. At least in its earlier form the mouth is wide, tall and funnel-shaped. These features may have been designed specifically to accommodate a funnel required to drain a greasy and relatively slow moving viscous commodity (filling a vessel with an easily manipulated liquid, such as wine, requires neither a wide mouth, nor a funnel).¹¹⁶ If correct, then the evolution of the LR2 shape, especially the mouth (as described in the introduction), may be indicative of content. Thus, the earlier LR2 form may have been used exclusively for olive oil, while the later development (with a more cylindrical neck and narrower mouth) carried both olive oil and wine. In this respect it is significant to recall that evidence that LR2 was a versatile container comes almost exclusively from late archaeological contexts of the seventh century (amphorae from the ecclesiastical complex on Samos and the Yassi Ada shipwreck).

B. LR2 Distribution and the *annonna militaris*

If, on the basis of the afore-mentioned arguments, our view that the LR2 was *originally* used exclusively as an olive oil container is correct, then it follows that this amphora type circulated within a well-organised economic structure. Was the State the protagonist behind inter-regional exchange or was the private entrepreneur responsible, choosing to sell commodities to economically dependent areas where comparable produce was absent or scarce? In order to answer this question one should take into account the function of the sites where LR1 and LR2 are found in large quantities.

Particularly significant is that the majority of sites where LR2 has a high profile (either most popular, or second most common following closely behind LR1) are military establishments along the Danubian *limes*: Viminacium, Iatrus, Topraichioi, Independenta, Dinogetia, Sacidava, and possibly also Sucidava. It is even more revealing that outside the Danubian border some Aegean sites with a similarly high LR2 visibility (excluding the LR2 production centres, like Halieis or possibly Argos) also have a distinct military character: the fortress at Emporio on Chios, and the double fort at Louloudies. In my view, these observations justify the assumption that LR2, as well as LR1, were particularly important in the late antique Balkan area first and foremost because they were the main receptacles of the military *annonna* in olive oil (LR2) and wine (LR1) transported to the region's military establishments.

Indirect evidence for the role of these two containers in a well-organised system of foodstuff distribution is provided by their inscriptions. These are either *dipinti* or *graffiti* in Greek letters, interpreted either as inscriptions of theological meaning,¹¹⁷ or as numbers indicating vessel capacity;¹¹⁸ sometimes the name (presumably of the owner?) is also added.¹¹⁹ Such *dipinti* and/or *graffiti* appear on LR1 and LR2 types more often than on any other contemporary amphora. At Iatrus, for example, only six out of a total of seventeen different amphora types attested incorporate *dipinti*; LR1 and especially LR2 are associated with the overwhelming majority.¹²⁰ Among the amphorae from

Yassi Ada, *graffiti* (not *dipinti*) scratched into the clay after firing have been reported from ninety-five of the 460 LR2 vessels, and from only three of the sixty LR1 vessels examined. If part of the inscriptions on individual amphorae were indeed indications of capacities, then their frequency mainly on LR1 and LR2 vessels indicates that the production and distribution of these two vessel types were under the control of a well-organised central authority, which felt the need to carefully identify and measure transported commodities. This kind of control would have been most necessary for foodstuffs intended either for the military or the civilian *annona*. However, the apparent scarcity of LR2 in Constantinople (although perhaps a result of limited excavation), may indicate that the olive oil destined for the civilian *annona* in Constantinople reached the capital in different containers. Furthermore, it would have been more efficient to gather the latter from neighbouring Bithynia,¹²¹ rather than from the Aegean.

It may be argued that the closest parallel to the distribution of Aegean olive oil in Late Antiquity to military sites in the Balkans (especially the Danube) and Aegean forts is Roman Baetica in modern Spain, which was the main supplier of olive oil (and even wine and garum) to the *limes* forts of north-west Imperium Romanum.¹²² The impressive control exercised over the production and distribution of Baetican olive oil is evident from the control stamps on Dressel 20 amphorae (which name their town of origin, net vessel weight, type of oil carried, and producer's name) and by a number of inscriptions mentioning officials who supervised the production, transport, and payment of freight to private *navicularii*. The State's involvement in this market, aimed at guaranteeing olive oil supply to the city of Rome and for the *annona militaris*, becomes very clear by the reign of Severus, when amphorae bearing stamps with full or abbreviated imperial titles appear. Baetica remained the main supplier of olive oil to Rome during the first and second centuries A.D., but during the third century its mass production was undercut by N. Africa. However, it has been suggested that during the later third to early fourth century, Baetica concentrated export to fort sites along the *limes*. By the fourth and fifth centuries the industry produced even smaller quantities of olive oil, and exchange was restricted to fewer markets in the West Mediterranean.¹²³

If Baetican oil was thus restricted and N. African produce was mainly destined for Rome, it would be natural to assume that the substantial demands for olive oil by garrisons along the Danubian frontier and in the Balkan forts would have had to be fulfilled by another olive oil producing area, presumably close by. The Aegean fitted this role perfectly and it is no coincidence that the rapid development of olive culture during the fourth century has been perceived not just in the Southern Argolid in the Peloponnese, but also on the Aegean islands of Lesbos and Thera (future research will most probably enrich this list).¹²⁴ This investment does not seem to be an isolated example of localised imperially blessed, or even instigated, concern. The radical change observed in amphora distribution during the fourth century, when much of the diversity notable amongst Roman Imperial types is superseded by a few, completely new large containers, mostly produced in the Levant (these are all six of Riley's amphora 'package'), has also been regarded as another officially-initiated act to promote agricultural productivity in the Eastern Mediterranean.¹²⁵ All these changes should be viewed against historical developments in the Eastern Roman Empire in the fourth century, when Constantinople became a capital and soon the largest of many

cities in the Eastern Empire. The dislocation from the West, where barbarian incursions had interrupted agricultural production and trade, necessitated systematic agricultural exploitation in the East, where new opportunities for products arose. Throughout the fourth centuries, emperors like Diocletian, Constantine and Valens had reorganised and strengthened the Empire, paying particular attention to a seriously threatened imperial border, and the one closest to the new capital, the Danubian frontier. It is clear that the efficient supply of the imperial armies in this zone was also one of the greatest imperial worries.

Calculating the scale of demand for olive oil in provisioning the North Balkans is an issue directly related to estimating the size of the military presence in this area, itself fraught with difficulties due to the nature of our sources.¹²⁶ The late Roman army of the Danubian border would have comprised three main groups: firstly, the *limitanei* (the infantry and cavalry troops of the frontier divisions and the permanent garrisons, together with their attached auxiliaries, which provided local static and mobile reserves); secondly, large parts of the *comitatenses*, i.e. the field armies of the *Magister militum per Illyricum* (responsible for the defense of the Danubian provinces of Moesia I and Dacia Ripensis) and the field armies of the field army of the *Magister militum per Thracias* (responsible for the defense of the Danubian provinces of Moesia II and Scythia); and thirdly, a series of small flotillas, maintained along the Danube and in the ports along the west coast of the Black Sea, which included both warships and transport vessels of various capacities. During the reign of Justinian, a new field command, the *questura exercitus*, was added (see below), which included a further fleet of transport vessels.¹²⁷ Furthermore, a substantial number of federate or allied forces must have existed; the Empire usually employed them next to the regular field armies and the frontier divisions, either permanently or on a short-term mercenary basis.

This army manned two main lines of defense: the first was a linear frontier consisting of fortified posts, major fortresses and a connecting network of minor fortified positions; the second one, made up of a reserve of mobile field units, was scattered in garrison towns and fortresses across the provinces behind the frontier.¹²⁸ In his *Buildings* (IV.v.-vii, xi), Procopius enumerates about 130 forts (at least twenty-three of them newly built by Justinian and the rest restored by him) within the territory of the four Danubian provinces of the Eastern Empire: Moesia I, Dacia, Moesia II and Scythia. Even if the obviously panegyric tone of Procopius's work casts some suspicion on the extent and effect of Justinian's building and restoration programme on the military establishments in the area, we have no substantial grounds to doubt their number. It is worth noting that eight of Procopius's forts, Sycibida, Nicopolis, Novae, Halmyris (Independenta), Tomis, Iatron, Scedeba and Viminacium (if we make an allowance for the site of Svetinja, situated 1,200 m east of Viminacium),¹²⁹ are among the sites where a strong presence of LR2 has been archaeologically attested.

Next to these 130 or so forts, we should also take into account the stations of the legionary troops. According to the *Notitia Dignitatum* (dated between A.D. 395 and 413), the eight legions of the four Danubian provinces (two for each province) were accommodated in the following twenty-one stations: Singidunum, Viminacium and Cuppi (in Moesia I), Variana, Cebus, Oescus, Sucidava, Aegeta, Transdrometa, Burgus Novus, Zernae and Ratiaria (in Dacia), Novae, Sexagintaprista, Durostorum and

Nicopolis (now τὴν Ἐξαγία)

Transmarisca (in Moesia II) and Noviodunum, Aegissus, Platypegiae, Troesmis and Axiupolis (in Scythia).¹³⁰ Three observations are important at this stage. Firstly, two of the afore-mentioned stations (Sucidava in Dacia and Novae in Moesia II), and possibly a third one (Viminacium in Moesia I, see above), are among the enumerated sites with a possible strong LR2 profile; secondly, eleven of these stations (Singidunum, Viminacium, Oescus, Ratiaria, Durostorum, Nikopolis, Novae, Aegissus, Axiupolis, Noviodunum and Troesmis) have the status of a city (they are mentioned in the *Synekdemos* of Hierokles);¹³¹ finally, according to the conclusions of modern scholarship, which estimates that during the fourth and fifth centuries the strength of a legion was around 1,000 men,¹³² the total legionary manpower in the Danubian stations mentioned above, should have been around 8,000 men. Next to them, Treadgold estimates another 36,000 men for auxiliary units and cavalry, bringing the total of the *limitanei* in the four Danubian provinces up to 44,000 men.¹³³ This is well below Jones' estimate of 64,000 men.¹³⁴ A compromising average between these two figures would give 54,000 as the strength of the *limitanei* in the four Danubian provinces around the beginning of the fourth century.

The total number of the *comitatenses*, the mobile field forces in the Balkans in the fourth century, is estimated at 42,000 by Treadgold (17,500 for the *Magister militum per Illyricum*, plus 24,500 for the *Magister militum per Thracias*),¹³⁵ or at 41,000 by Haldon (who proposes 23,500 for the *Magister militum per Thracias*). These mobile troops must have been dispersed in numerous forts all over the Balkans, but it is only reasonable to assume that a large part of them (half of their total manpower, if not more) was in – or very near – the four Danubian provinces. Haldon has suggested that by the end of Justinian's reign up to three-quarters of these field army units became permanently garrisoned in, or near, frontier towns and cities, where they served as reinforcements to the frontier garrisons in many cases, rather than as a mobile reserve.¹³⁶ This would imply that about 13,125 men (three-quarters of the *Magister militum per Illyricum*) were added to the *limitanei* of Moesia I and Dacia Ripensis, while about 17,625 or 18,375 men (three-quarters of the *Magister militum per Thracias*, according to the estimates of Haldon and Treadgold respectively) were added to the *limitanei* of Moesia II and Scythia.

It does not, however, necessarily follow that the army force on the Danubian frontier increased dramatically during Justinian's reign from 54,000 (number of *limitanei* in the four Danubian provinces; see above) to 84,750 or 85,500 (number of *limitanei*, plus three-quarters of the combined manpower of the *Magistri militum per Illyricum et Thracias*).¹³⁷ The permanent shift of these large units of *comitatenses* to nearer the Danubian frontier was meant to fill the gaps created amongst the ranks of the Danubian *limitanei* during their long battles against the invading barbarians, which must have also claimed their toll amongst the original ranks of the Balkan *comitatenses*. Further losses may also have occurred through desertions, while the demands of the Justinianic campaigns in the West must have put additional strain on the Danubian legions. Under these conditions, it seems more probable that the military presence in the Danubian provinces was somewhat weaker in Justinian's reign than when the *Notitia Dignitatum* was composed in the early fifth century, for example, when the total manpower in the four Danubian provinces must have numbered – in my view – at least 75,000 (54,000 *limitanei*, plus at least another 21,000 troops: half of the combined manpower of the *Magistri militum per Illyricum et Thracias*).

Military requirements would have affected both the immediate hinterland and the cities in the northern Balkans. Regarding imports in particular, it is reasonable to assume that the Danubian cities (the *Synekdemos* enumerates thirty-two cities in the four Danubian provinces) received similar imports to those dispatched to the region's forts. These could have reached the cities as either direct imports, or as objects exchanged between the local inhabitants and the soldiers at the forts.¹³⁸ Because of the relatively greater prosperity in cities, one would presumably expect to find a greater diversity of imported goods there, than in the stagnated life of a fort. This means that a city should possess a broader variety of imported transport vessels, while the forts should contain a more limited range of imported types, reflecting the arrival of standardised and pre-ordered foodstuffs. This point is well illustrated when one compares the variety of amphora types at Nicopolis ad Istrum and the Bulgarian fort of Golemanovo Kale, for example. While there are only three types of amphora at the fort (LR1, LR2 and LR8),¹³⁹ a broader variety of types (LR3, LR4, LR5 and the N. African P/W Class 33) are attested at Nicopolis and other civilian settlements.

Unfortunately, the Imperial concern over the supply of wine and olive oil to the Danubian or Balkan forts is not illustrated in the inscriptional record of LR1 and LR2 as vividly as in the case of the carefully stamped Dressel 20 amphorae and other Baetican olive oil containers. This fact may suggest that the State was not so directly involved in this kind of specific trade in the Eastern Roman Empire. An impression, however, of direct imperial concern over the adequate provisioning of the Danubian provinces in general can be obtained through the archaeological record and, in fewer cases, through the written sources. The excavation results from Iatrus and Nicopolis ad Istrum suggest that despite difficulties caused by the Gothic and Hunnic invasions, and by the consequences of the defeat of Valens at Adrianople, the Danubian provinces continued to enjoy a high level of prosperity until the mid-fifth century, based upon local, large-scale grain production on one hand, and imports of olive oil and (to a lesser extent) wine and other products on the other.¹⁴⁰ However, this picture seems to change after the mid-fifth century, when barbarian in-roads became more frequent and disrupted crop sowing and harvesting. Evidence from Nicopolis ad Istrum indicates that imported amphorae from a variety of sources (Africa, Aegean, Cilicia and even Gaza) became far more popular in the city during the period from c. 450 to 600. This has been interpreted as an imperial initiative introduced in order to meet the deficiencies in local agricultural supply, caused by the enemy or even perhaps climatic change (although the latter is hard to prove).¹⁴¹ Consequently, instead of a settlement depending on its economic hinterland, the city became a military and ecclesiastical stronghold maintained and supplied directly by the imperial government whose interests it served.¹⁴²

A similar picture emerges for the fort at Independenta,¹⁴³ where the high quantities of LR1 and LR2, particularly towards the end of the sixth and the beginning of the seventh century, can only be explained by the central administration's conscious efforts to maintain an efficient and constant supply of necessary foodstuffs to the *limes* forts. The continuous import of these two amphora types to Independenta during such troubled times must surely indicate that their content was of primary importance to the fort's occupants.

The imperial initiative towards the maintenance of an efficient supply system for the Danubian provinces is best demonstrated by the Justinianic creation of the new administrative unit of the *Quaestura Exercitus* in 536, which included the peculiar combination of two Danubian (Moesia II and Scythia) and three Aegean provinces (Caria, the Cyclades and Cyprus). Texts inform us that the main purpose of this reorganisation was to ensure that the forces in the Danube residing in Moesia II and Scythia received their *annona* supplies from the Aegean provinces. The *questor exercitus* had to cater for both the *comitatenses* (mobile troops) and the *limitanei* (border troops) and the law creating the office contained a schedule of the *annonae* of both army bodies of Mysia and Scythia. Unfortunately this section in Justinian's novels is lost.¹⁴⁴

Commodities from the Aegean and more distant regions, intended for the forts and cities within the southern Danubian plain, would have been easily transported by ship through the Black Sea and then west up the Danube, possibly on shallow-draft boats. This route is confirmed by the upper part of the body of an LR2 amphora discovered with other amphora sherds underwater near Neseber in Bulgaria (Fig. 7.2), that most probably originates from a shipwreck dated c. A.D. 500–625.¹⁴⁵

Aegean imports destined for the inland cities of the North Balkans, like Stobi and Garicin Grad, must in all probability have passed up the Vardar valley through Thessalonica over a distance of 160 km. The alternative route, however, from the Adriatic across the Via Egnatia to Heraclea and then up to Stobi was far longer (about 325 km) and thus less favourable.

Although no concrete evidence exists about the kind of ships that transported these supplies to the Danubian troops, or about vessel ownership, a hypothesis can be put forward concerning the origin of these ships. The present overview of amphora assemblages from Balkan and Aegean sites clearly demonstrates the close relationship between LR1 (produced on a number of sites along the Cilician coast near Antioch, and also on Cyprus) and LR2 (an Aegean product). A similar picture emerges when one considers a wider sample of amphora finds from the Mediterranean, which demonstrates that not only are LR1 and LR2 usually found together, but also that the presence of LR2 presupposes the presence of LR1, while the opposite is not always the case.¹⁴⁶ On the basis of this economic juxtaposition, the assumption that ships coming from Syria and Cilicia with LR1 cargoes stopped in the Aegean to take on LR2 consignments seems reasonable.

In this respect, it is worth noting the reference to Cilician merchants in the so-called 'Tariff of Abydos', dated to the reign of Anastasius (c. A.D. 492), which specifies the import, export and control taxes that merchants bringing foodstuff to Constantinople paid to state officials at the customs of Abydos.¹⁴⁷ The text mentions four different groups of merchants: firstly wine merchants, secondly merchants of olive oil, dried vegetables and lard, thirdly the wheat merchants, and fourthly the Cilicians. While all other merchants are defined according to the commodity in which they traded, the Cilicians are defined by their place of origin. This may imply that in contrast to other merchants, the Cilicians were associated with a highly specific form of exchange. Furthermore, the tariff clarifies that they paid 1 carat less import tax than the merchants involved in the transport of wine, olive oil, dried vegetables and lard. The special privilege accorded to the Cilicians is hard to explain. Durliat and Guillou have

dismissed, rightly in my view, Antoniadis-Bibicou's argument that this privilege was due to Anastasius's personal favouritism towards the Isaurians; in the opinion of the two French scholars, the Cilicians' privilege was possibly due to the fact that they used smaller ships than those of Egyptian or Syrian merchants and, therefore, paid less tax proportionately. They also noted, however, that if this was true, then a similar privilege should have been bestowed on other small ships. The exception made to the Cilicians still remains puzzling.

I find it difficult to accept that the Cilician merchants, coming from a particularly rich and fertile area with a long tradition in sea-trade,¹⁴⁸ would have confined their movements to ships of limited tonnage. Bearing in mind that the Cilicians originated from the main production area of LR1,¹⁴⁹ and that they had to sail through the Aegean *en route* to Constantinople, where they probably had numerous supply depots, I would prefer to explain their privilege in terms of their special status as the main transporters of the military *annona* to the Danubian provinces. It is possible that portions of their cargo were commercial and intended for the capital, which compelled them to pay some tax at the Abydos customs-house. The largest consignment amongst the Cilician ships' cargo, however, may well have comprised LR1 and LR2 intended for delivery to the ports on the west coast of the Black Sea.

Undoubtedly, taxes levied in kind, which proved to be surplus to seasonal military requirements, would have subsequently entered the trade chain as commercial produce, and it is thus that LR2 containing olive oil were diffused more broadly across the Mediterranean basin in Late Antiquity, reaching as far as the British Isles. This well-organised exchange system, which designed and produced LR2 intentionally to package olive oil destined as *annona militaris*, but also allowed the surplus to enter the free market, was bound to lose its equilibrium when its main market, the Danubian frontier, gradually slipped away from Byzantine control and hostilities extended across most of the Balkan peninsula. These problems certainly must have affected the strong chain of demand and supply that existed between the North Balkans and the Aegean, and most probably caused a certain decline in the agricultural production, as well as in the production of LR2 containers. I believe that it is within this context that we should explain the increased tendency from the second half of the sixth and through the seventh century of LR2 recycling and their indiscriminate use to transport both olive oil, wine, and perhaps also other commodities. (We may assume that the Arab raids throughout the seventh centuries caused similar problems to the main production areas of LR1). It is this gradual disassociation of LR2 from the exclusive transport of olive oil that led, in my view, to the alteration of its formal characteristics that can be perceived from the second half of the sixth century onwards.

The ideas expressed above, should be viewed as a working hypothesis, which may well be modified or revised in the light of future excavations; as with all archaeological data any conclusions remain dependent upon the interpretation of what is inevitably a slender body of evidence. It is obvious, for example, that the amphora evidence from the first ten or so excavated Danubian military establishments (discussed above) represents less than one-tenth (according to Procopius's testimony) of the original total – mostly unexcavated and not yet surveyed – and that a wider sample of civilian settlements from the area needs to be studied in order to compare our conclusions regarding military trade and settlement.

Nevertheless, I hope to have demonstrated clearly the crucial importance of future quantification of well-stratified pottery assemblages from the areas under discussion and, furthermore, the great potential they can contribute to our study of the late antique Balkan and Aegean economy. I conclude by wishing that such studies will appear shortly, in order to complement, revise or completely overthrow the tentative conclusions presented here.

Notes

- 1 I would like to express my thanks to Dr. Marlia Mango for initiating my interest in amphora studies, and to Dr. B. Ward-Perkins, Dr. N. Pollard, Dr. J. Howard-Johnston, and the editors of this volume, for their useful comments on the first draft of this paper especially Sean Kingsley who kindly prepared the maps for this paper; none of the above are responsible for its shortcomings.
- 2 Riley, 1989: 151. The other five amphorae in this 'package' are LR1 (see Decker, Chapter 4), LR3 from western Asia Minor, the Palestinian LR4 and LR5 (see Kingsley Chapter 3), and the North African LR8 (*spatheia*).
- 3 'The Archaeology of Late Antique Thessaly', under the supervision of Dr. Marlia Mango, St. John's College, Oxford (expected date of submission, end of 2000).
- 4 For a quick reference on this point, which is more extensively discussed in my thesis, cf. Riley, 1975: 33 (on Caesarea), Pollard, 1998: 158 (on Karanis, Egypt), Riley, 1979: 217-8 (on Berenice), Riley, 1982: 117 (on Carthage: American mission), Peacock, 1984: 119 (on Carthage: British mission), Keay, 1989: 47-8 (on Sabratha), Wilson, 1990: 267-8 (on Sicily), Bonifay and Piéri, 1995: 109-11 (on Marseille), Keay, 1984: 352-7 (on Spanish Catalonia), Thomas, 1959: 91-2 and *idem.*, 1981: 9-11, 26-7 (on British Isles).
- 5 Opait, 1984: 311.
- 6 Ballance *et al.*, 1989: 106; Thomas, 1959: 91-92.
- 7 Cf. Scorpan, 1975: 311, pls. II.8-9, IX.5, 7 (subtype A1), pls. II.10, IX.8, 9 (subtype A2), pls. III.1, 2, IX.9 (subtype A3); *idem.*, 1976: 177, pl. VII and *idem.*, 1976: 274, fig. 10; Riley, 1975: 33, distinguishing between earlier (fifth century) and later (early sixth century) examples; Böttger, 1982: 38-41; Bass and van Doorninck, 1982: 157-60, figs. 8-5: nos. CA 13-17 (subtype 2a) and nos. CA 18-20 (subtype 2b); van Doorninck, 1989: 248 (four major and forty secondary subtypes); Hayes, 1992: 66 (subtypes 9A and 9B); Bonifay and Piéri, 1995: 109-10, fig. 53-5 (earlier form) and 8.55 (later form).
- 8 Such a study requires extensive fieldwork on LR2 kilns found outside its main production areas.
- 9 The main work on this issue is that of Opait, 1984: 312-6, tafeln II, XII. Similar observations have been made by Bonifay and Piéri, 1995: 109-10.
- 10 Peacock and Williams, 1986: 7-8.
- 11 For example, Falkner defines types in his report on the pottery from early Byzantine Nicopolis ad Istrum by studying the appearance of wares visible at x10 magnification; Falkner, 1999: 58, 274.
- 12 Amphorae are notoriously bad indicators of short-term chronology, as they seem to have been less susceptible to regular stylistic changes than other pottery forms such as fine-wares.
- 13 For warnings against the inappropriate dependence on quantified data based on unrepresentative pottery, see Bonifay, 1986: 295-6, and Tomber, 1989: 506.
- 14 A more extensive commentary (with quantified data in tabulated form) on the amphora evidence from many of these sites is found in my thesis.
- 15 Hayes, 1968: 215; *idem.*, 1992: 62-71, esp. 66 and fig. 22.8, 10-11.
- 16 The latest coins in the final destruction levels of the site date to the fifth year of the reign of Justin II, A.D. 569-570; cf. Wiseman, 1973: 19.
- 17 Anderson-Stojanovic, 1992: 96-97, pls. 82-3 and 184, esp. 96, pl. 82.700-701 and pl. 184: C-71-359 (LR2).
- 18 Bjelajac, 1990: 160, 175-6 (on amphorae), esp. 176 (type V/5), pl. XXI/7 (LR2).
- 19 Bjelajac, 1990: 175.

- 20 Popovic, 1987, 35–7, fig. 13–14.
- 21 Kazhdan, 1991c: 970.
- 22 Bartosiewicz *et al.*, 1995: 5. The results of the excavations, carried out by members of the Bulgarian and East Germany Academy of Sciences, have been published in a series of five monographs; cf. Dimova *et al.*, 1979; Böttger *et al.*, 1982; Wendel *et al.*, 1986; Hermann *et al.*, 1991 and Bartosiewicz *et al.*, 1995.
- 23 The pottery from Iatrus was published in Böttger, 1982: 33–148 (1966–1973 seasons) and in Böttger, 1991: 157–66 (1975–1981 seasons). Conclusions on the economy of Iatrus, based on the combined pottery evidence, were discussed in Böttger, 1995: 67–80. Böttger’s dating of the excavation layers at Iatrus has received criticism (Mackensen, 1991) and his amphora typology is not free of serious weaknesses either. This issue is extensively discussed in my thesis.
- 24 Böttger, 1982: 70, tabelle 1 and Böttger, 1991: 157, tabelle 1.
- 25 Herrmann, 1986: 12; Wendel, 1986: 115–6, tafel 19.2, 19.4–8, 19.10–11, 38a (LR2) and 19.12–16 (LR1).
- 26 Poulter, 1999: 3–27 (on the history of the excavations and a description of the site).
- 27 Poulter, 1999: 6–7, 11–3.
- 28 Poulter, 1999: 28; Falkner, 1999: 115.
- 29 Falkner, 1999: 114 (table 8.1) and 274–80 (Appendix: the Wares). On Falkner’s ware no. 94 (LR2), cf. *idem.*: 252 and fig. 9.52: 1056–62.
- 30 Falkner, 1999: 117, fig. 8.4.
- 31 Falkner, 1999: 281–96.
- 32 Tudor, 1965: 13–20, 28–34, 79–101, figs. 4 and 16. Cf. also Kazhdan, 1991e: 1974.
- 33 Tudor, 1965: 88, 114, 119–22, figs. 32–33 (*dipinti*), pls. IV.4 (LR8) and XXV.6 (LR2), 9 (LR1), 10 (LR4).
- 34 Mackensen, 1992a: 239.
- 35 Mackensen, 1992a: 239–54, esp. 239–42, tafel 51.1–7 (LR2).
- 36 Mackensen, 1992b: 354.
- 37 36 For a brief presentation of the site and the excavation results until 1990, cf. Press and Sarnowski, 1990. Articles on the excavation’s progress, and on various finds from Novae, have been published mainly in the following journals: *Archeologia* (from 1973), *Latomus* (from 1974), *Klio* (from 1976), *Meander* (from 1979) and *Eos* (from 1980). Information on the amphora finds is expected to be included in Sarnowski, T. (ed.), *Novae. Das Stabsgebäude. Architektur und Funde* (Limesforschungen. Römisch-Germanische Kommission), Frankfurt (forthcoming).
- 38 Cangoa *et al.*, 1981: 142, fig. 61.
- 39 Radulescu, 1976: 114: “Birneförmige Amphoren mit Streifen (LR2) [sind] in der Dobrușca sehr verbreitet”; Scorpan, 1975: 311: “Le type A (i.e. LRA 2). La plus répandue (et caractéristique) forme d’amphore de la Dobroudja romano-byzantine”. Cf. also, *idem.*, 1976: 177 and 1977: 274, where the same statement is repeated.
- 40 Riley, 1979: 218–9. The only kiln studies in the area, as far as I know, are the works of Coja and Dupont, 1979 (on archaic, classical and Hellenistic kilns at Histria), and of Irimia, 1968 (on three late antique kilns excavated at Oltina). The latter kilns were used primarily for firing bricks and roof-tiles; on the basis of petrological analysis (Williams, 1982: 102), the numerous amphora sherds with “combed surface” (probably LR2), which were also discovered during their excavation, were not produced locally.
- 41 Kazhdan, 1991d: 1825.
- 42 Scorpan, 1973: 328–31 (English summary of the excavation results regarding the site stratigraphy), 320 (on pottery finds), and figs. 34 (LR1) and 36.3 (LR2).
- 43 Scorpan, 1975: 311–2, pls. II.8–10, III.1–2, IX.5, 7, 8, 10, X.1–2 (LR2).
- 44 Kazhdan, 1991a: 625.
- 45 The width of the ash layer recorded during the excavations was 1.5 m; cf. Barnea, 1966: 237. The date of the destruction of Dinogetia is also confirmed by coin finds in the east part of the north-west sector of the fortress: twelve coins found in rooms I, VI, VIII and XI dated from the fourth to sixth century, the latest being a Justinianic issue from Constantinople of A.D. 552–3; cf. Barnea, 1966: 240, 249, 253, 257.
- 46 Barnea, 1966. Excavations in the north-west sector of the fortress were specifically intended to shed light on the late antique phase of the settlement pre-dating the great fire of 559 (until then more

- attention had been given to the upper layers of the tenth to twelfth century houses). For a plan of the fortress, cf. Barnea, 1980: pl. IX. For a detailed plan of the eleven rooms excavated in 1966, cf. Barnea, 1966: figs. 1-2; on amphorae from the site, cf. *idem*, p. 244-5, 250, 254 and figs. 5.7, 8.7 and 12.7 (LR2).
- 47 On the excavations conducted by the Archaeological Institute of Bucharest and the Danube Delta Museum of Tulcea, see Zahariade *et al.*, 1987.
- 48 Opait, 1991: 139-40 (nos. 52-63) and pls. 8-9 (LR2; Opait, Amfore piriforme, Tip II); 145-6 (nos. 101-5) and pl. 17 (LR1; Opait, Amfore ovoidale, Tip I.1); 214, pls. 50-51 (histograms on the relative proportions of the two types at Independenta, Topraichioi, Iatrus, Berenice, Carthage and Istanbul); 215, pl. 52 (graph showing the fluctuations of the two types at Independenta between the first half of the fourth century and the second decade of the seventh century).
- 49 Zahariade and Opait, 1986: 565-71.
- 50 Opait, 1991: 214.
- 51 Kazhdan, 1991b: 939. Cf. also Preda and Nubar, 1973: 174-233, esp. 241.
- 52 Condurachi, 1961: 269, pl. IV and fig. 11.
- 53 Suceveanu *et al.*, 1982: 99, 120 and pls. 4: III.4 and 18: 61. The sector containing the two second century A.D. baths became a commercial region in the fourth century, and was later occupied by a basilica and a cemetery before being abandoned in the seventh century; cf. Suceveanu *et al.*, 1982: 75-92.
- 54 Browning and Kazhdan, 1991: 2092.
- 55 Radulescu, 1973: 197-198 (on the amphora contents), 202-3 (on the *graffiti* and *dipinti*) and figs. 6-7. Cf. also, Scorpan, 1976: 170, 180, 182 (on LR4 containing nails), and *idem*, 1977: 276.
- 56 Barnea *et al.*, 1979: 190, figs. 167-8, 170; 3.5 (LR1), and 167-170: 3.2 (LR2).
- 57 On the 1961-1964 excavation results, cf. Bass and van Doorninck, 1982, where a representative sample of thirty LR1 and eighty LR2 is discussed. On the larger sample of LR1 and LR2 that was raised from the seabed later, cf. van Doorninck, 1989. The re-examination of the Yassi Ada amphorae, in the light of the far larger 1989 sample led to new conclusions regarding the typology of these vessels, enriched the collection of *graffiti* available, and enabled the organic contents of intact amphorae to be examined. It is evident that the 'final' Yassi Ada shipwreck publication of 1982 must always be appreciated against the background of these later observations.
- 58 Fagerlie, 1982: 144-54. The absence of weapons on-board may also imply that the voyage occurred following the withdrawal of the Persian fleet from the Aegean in 626; cf. van Doorninck, 1989: 247.
- 59 van Doorninck, 1989: 248.
- 60 Their maximum diameter (averaging 43 cm) occurs at one-half and equals three-fourths of the total height; the height of the neck plus its maximum diameter equals 1/4 of the total height of the vessel; all maximum diameters for necks fall within 1.5 cm, and capacity variance within the group is minimal.
- 61 van Doorninck, 1989, fig. 1.1, 1.4 and 1.7.
- 62 Hautumm, 1981: 9, 174.
- 63 Hautumm, 1981: 21 (on LR2), 77 (on P/W class 35), 116 (on LR8).
- 64 Steckner, 1989.
- 65 Gerousi, 1992-3: 252-7, figs. 1-4.
- 66 Ballance *et al.*, 1989: 3, 7-8 (on the history of the fortress), 106-7, figs. 37-38 and pls. 24-25 (on the amphora finds). LR2: nos. 236, 237, 238 and 240.
- 67 Garnett and Boardman, 1961: 113, fig. 13.38.
- 68 Abadie-Reynal and Sodini, 1992: 7-8 (on the provenance of the material), 53-62 (on amphorae), 56-7, nos. CC284-319, figs. 23-24 and pl. Va-c, e (LR2). Our quantified data are based on the numbers of the separately counted bases, body fragments, handles and complete or upper bodies of vessels for each amphora type, as listed in the site publication.
- 69 Papadopoulos, 1989: 67-78, figs. 2-3.
- 70 Papadopoulos, 1989: 83-102, esp. 83-7, 100 and fig. 11 (on type I, i.e. LR2); cf. also *idem.*, figs. 8c and 9a-b: LR2 used for burials.
- 71 Our quantified data are based on Papadopoulos, 1989: 82, table 3.
- 72 For example, sherds retrieved during the 1965 excavation of rooms next to the Octagonon in the Palace of Galerius include LR2 and LR4. Cf. Petsas, 1966: 334 and figs. 343b, 343d.

- 73 Poulter *et al.*, 1998: 463–4, 483–5 and fig. 14.
- 74 Beckmann, 1998: 503, 505–6 (on amphorae), fig. 25: nos. 23, 25 (LR2 thick, flared rims) and fig.25: no. 24 (LR2 knobbed base).
- 75 Einwanger, 1981: 21ff and esp. 23ff (on the date), 48 and tafel 60: III511–3, 517, 519 (LR2 rim fragments).
- 76 Iatridou, 1976: 190–2, pl. 139c-d.
- 77 Personal observation made during fieldwork in summer 1996. On the middle Byzantine church of Episkopi on Skopelos, cf. Andreas Xyngopoulos, 1956, 181–98.
- 78 On these shipwrecks, including at least four wrecks of the fourth century B.C. and five of the middle Byzantine period, cf. Mavrikis, 1997: 286–320. No late antique shipwrecks have so far come to light in the area.
- 79 Robinson, 1959: 109, M272, pl. 29 for a late fourth century example. Cf. also M235, pl. 28 and P4129, P16074, pl. 40.
- 80 Broneer, 1959: 321, 336–337 (no. 16), and pl. 72b.
- 81 Pers. comm., Dr. J. Hayes 1999.
- 82 Williams and Fischer, 1976: 133 and pl. 23.79; Williams and Zervos, 1983: 26 and pl. 10.72.
- 83 Warner Slane, 1990.
- 84 Sanders, 1999: 459–63.
- 85 Adamsheck, 1979: 108–24, pls. 26–27; esp. 114–7: RC 14 (LR2) and RC 16 (a probable LR2 of later date).
- 86 Adamsheck, 1979: 114–5, pl. 26: RC14.
- 87 Abadie, 1989.
- 88 Ault, 1999: 55, fn. 5, 559–64, figs. 11–15. Evidence *ex silentio* (finds from the third century B.C. to the fourth century A.D. are virtually absent at Halieis) indicate that the site remained uninhabited until the fourth century: cf. Rudolph, 1979: 304, fn. 22.
- 89 No signs of late antique fortifications have been discovered on the site. It appears likely – although not yet corroborated by any archaeological evidence – that the harbour was still in use during Late Antiquity. The date when the site was abandoned, caused by Arab pirates and/or Slav attackers, is placed in the early decades of the seventh century; cf. Rudolf, 1979: 296, 303–5.
- 90 Rudolph, 1979: 305–9, figs. 3–5. Numerous fragments of LR2 from the harbour area, decorated with spiral-grooving, were also recorded during the 1962–68 excavations: cf. Jameson, 1969: 339–340, fig. 9, and more generally Jameson *et al.*, 1994: 402.
- 91 Rudolph, 1979: 304, fn. 23.
- 92 Zimmermann Munn, 1985. It is possible that the LR2 kiln on site B-19, identified in 1985, was one of the two kilns already reported in 1979 by the Argolid Exploration Project.
- 93 Parker, 1992: 335.
- 94 Megaw and Jones, 1983: 246.
- 95 Goldstream and Huxley, 1972: 172 (no. 47), fig. 52, pl. 49 (probably a late example).
- 96 McDonald *et al.*, 1983: 353, 384 and pl. 10–10 (P1756).
- 97 Riley, 1982: 118.
- 98 Hautumm, 1981: 47.
- 99 Derda, 1992: 139, 146–51 (nos. 1–2 from Bulgaria and 2–7 from Rumania). For this reference I am grateful to Dr. Sean Kingsley.
- 100 van Doornick, 1989: 252, fig. 2.
- 101 On the issue of pitch-lining, see in particular Opait, 1998, where amphora types found during dredging operations of the Circular Harbour in Carthage were separated in the report into pitched and plain examples. The LR2 were in the category of non-lined amphorae and were thus assumed to have carried olive oil. LR2 fragments lined with resin were discovered at Marseille; cf. Bonifay and Piéri, 1995: 111.
- 102 Hautumm, 1981: 46–8.
- 103 Jameson *et al.*, 1994: 268–76 (on the history of olive cultivation in the area) and 385 (table 6.6), 400–4 (table 6.9) on evidence of olive cultivation during the Roman and late Roman period. Press apparatus from the Southern Argolid Survey is discussed in Runnels *et al.*, 1995: 128–33.

- 104 van Andel and Runnels, 1987: 105–9, 20–21 (maps); Jameson *et al.*, 1994: 383–94, figs. 6.17–18, back-pocket map 8.
- 105 Anagnostakis, 1996: 125, 127 and fns. 18, 34–6.
- 106 Poulter *et al.*, 1999: 41.
- 107 On these installations, see Böttger, 1995: 69, esp. fn. 8, with further bibliography.
- 108 Poulter *et al.*, 1999: 46.
- 109 Böttger, 1995: 69, fn. 8.
- 110 Böttger, 1995: 70 and 293.
- 111 Poulter *et al.*, 1999: 34.
- 112 Anderson-Stojanovic, 1992: 192–3.
- 113 Hayes, 1992: 66, fig. 22.12; Anderson-Stojanovic, 1992: 97, pls. 83.712–3; Böttger, 1982: 41–2, tafel 25; Iatridou, 1976: pl. 139c-f.
- 114 The LR2 from the Yassi Ada wreck did not illuminate this problem: the 165 stoppers from the shipwreck were all roughly rounded amphora sherds (av. dm. 5–7 cm) shaped to loosely fit the mouths of both the LR1 and LR2; cf. Bass, 1982: 160–161, fig. 8–7. The discrepancy between the number of estimated cargo vessels and the number of stoppers retrieved (900 compared to 165) may be explained by the excavation collection strategy, or because most stoppers were perishable, or (less likely) because many amphorae were empty during the ship's final voyage.
- 115 Hautumm, 1981: 51–2, 63. The small dimensions of LR2, as opposed to LR1, are also noted by Böttger, 1982: 87 and by Popovic, 1987: 13.
- 116 For possible such funnels, although of earlier date, cf. Robinson, 1959: 17 and pls. 2, 19: F64 (first century B.C. to first century A.D.), 85 and pl. 18: M9 (mid-first century A.D.), 95 and pl. 18: M119 (early third century A.D.).
- 117 For example, abbreviations of 'Virgin Mary is giving birth to Christ' and the Christian symbol A+Y ('Christ is the A and Y of life'). For an interesting group of LR2 from Rumania and Bulgaria bearing such inscriptions, cf. Derda, 1992: 136 and esp. 146–51.
- 118 For example, the most popular combinations of Greek letters on LR2 from Iatrus indicating numbers are NB (52), Ns (56) or nr (83), and are usually preceded by certain symbols, which have been interpreted as the alexandrino-italian *sextarius* (0.543 lt) or the heavy Roman *libra* (0.326 kg); cf. Böttger, 1982: 87–9. At Tomis, the most common letters painted on LR2 are N (50) and n (60), also interpreted as capacity indications in *sextarii*; cf. Radulescu, 1973: 202–203.
- 119 For example, the name *Baleriou Poritou* on a LR2 from Thasos; cf. Abadie-Reynal and Sodini, 1992: 56, fig. 24 and pl. Vc, e.
- 120 Amphora types with *dipinti* at Iatrus are Böttger's Forms I.1 (LR2), I.2 (PW35?), I.5, I.6, II.1 (LR1) and III.1 (LR1a?); however, Böttger states clearly that the *dipinti* "besonders häufig auf Amphoren der Form II (LR2) begegnen"; cf. Böttger, 1982: 87.
- 121 According to Constantine Porphyrogenitus, who often repeats information from earlier centuries, the olive oil from Nicaea was provided for the imperial household service during expeditions; cf. C. Porphyrogenitus, 1990. *Three Treatises on Imperial Military Expeditions* (ed. J. Haldon, Vienna), 132.601.
- 122 On the organisation of production and transport of Baetican olive oil in general, cf. Keay, 1984: 402–5; in particular for the *limes*, cf. Rodríguez, 1986: 765–6. Hautumm (1981: 48–51) has proposed that Dresel 20, an exclusive container of Baetican olive oil, became the prototype on which the LR2 was modelled because of its wide distribution and strong association with olive oil. A different view, which links the formal characteristics of LR2 to earlier Aegean amphorae, is discussed in my thesis.
- 123 Keay, 1984: 404.
- 124 Jameson *et al.*, 1994: 404.
- 125 Slane Warner, 1990: 109; Hayes, 1997: 32–3.
- 126 On the difficulties presented by the issue, cf. Jones, 1964: 679–86; MacMullen, 1980 and Treadgold, 1995: 43–64.
- 127 *Wars*, III, xi.13–16.
- 128 *Buildings*, IV.i.33–35.
- 129 *Buildings*, IV.vi.34–35 (Sycibida), xi.20 (Nicopolis), vi.1–3, 5 (Novae), vii. 20 (Halmyris, i.e. Independenta), xi.20 (Tomis), vii.6 (Iatron), xi.20 (Scedeba) and v.17 and vi.1 (Viminacium).
- 130 Jones, 1964: III, 370–1 (Appendix II).

- 131 *Synekdemos* 13 (636.1–8, on Moesia II), 20 (655.1–6, on Dacia), 21 (657.1–6, on Moesia I) and 13–14 (637.1–15, on Scythia).
- 132 MacMullen, 1980: 457.
- 133 Treadgold, 1995: 52.
- 134 Jones, 1964: 682.
- 135 Treadgold, 1995: 50 and fig. 6 on p. 48; Haldon, 1999: 100.
- 136 Haldon, 1999: 69.
- 137 Haldon (1997: 251) believes that “the main field armies of the empire in the mid-sixth century were maintained at approximately the same strength as in the early fifth century”.
- 138 For literary references to the engagement of soldiers in trans-Dunabian trade, cf. Poulter, 1999: 43.
- 139 With the exception of just one North African *spatheion*, type Keay XXVI G; cf. Mackensen, 1992: 251–2.
- 140 The ceramic evidence from Iatrus does not reflect any disruptions in the supply system to the Danubian forts during the last quarter of the fourth century caused by the Gothic invasions, or in the first half of the fifth century, caused by the incursions of the Huns; cf. Böttger, 1982: 83. The quality of workmanship and finish of the LR2 at Iatrus, in particular, remains almost equal throughout the site’s occupation according to Böttger, which may indicate that the city was supplied by the same production centres throughout its history; cf. Böttger, 1982: 38. Imported wares at Iatrus (amphorae, table- and kitchen-ware) remained constant throughout the city’s history (fourth to sixth century), at about 40% of the assemblage; amphorae represent no less than 30% of the total imported pottery during this period; cf. Böttger, 1995: 69, 71, 80. A similar picture of stable economic life emerges for Nicopolis ad Istrum for the period between the middle of the fourth through to the middle of the fifth century; cf. Poulter *et al.*, 1999: 45.
- 141 Poulter, 1999: 47.
- 142 If this officially sponsored supply of food and materials also constitutes payment for the Danubian army (instead of coin), then this might explain the low rate of coin loss at Iatrus and Nicopolis during the sixth century; cf. Poulter, 1999: 48.
- 143 Opait, 1991: 182.
- 144 *Just. Nov.* 41 (A.D. 536). Cf. also Jones, 1964: 280, 661. The separate mention of *comitatenses* and *limitanei* in the Justinianic novels may go back to the fifth century, since Justinian used large sections from the constitution of 443.
- 145 Bouzek and Kordac, 1963: 257, pl. I (below) and Parker, 1992: 287.
- 146 This point is amply demonstrated in my thesis.
- 147 Durliat and Guillou, 1984; esp. 596.
- 148 The compilation of the *Expositio totius mundi et gentium*, an exemplary sea merchants’ handbook written in the mid-fourth century – possible at Tyre (cf. Rougé, 1966: 9, 19, 32) – must have been influenced by the strong tradition of sea-trade along the whole of the East Mediterranean coast, from Cilicia to Palestine.
- 149 On the location of LR1 production centres, cf. Williams, 1979 and esp. Empereur and Picon, 1989: 33, fig. 21. For a LR1 kiln discovered in Paphos, Cyprus, see Demesticha and Michaelidis

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