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Carinated-Shoulder Amphorae from Sarepta, Lebanon: A Phoenician Commodity and its Intra-Regional Distribution

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During the early 1970s a team from the University Museum of the University of Pennsylvania excavated the tell of Sarepta on the shores of southern Lebanon between Tyre and Sidon (e.g. Anderson 1987; 1988; 1989; Khalifeh 1988; Koehl 1985; Pritchard 1975; 1978; 1988). Among their many discoveries, the excavators uncovered substantial remains of a major pottery manufacturing industry. The remains indicate that pottery manufacture had taken place at Sarepta between the mid 2nd millennium BC to the Early Hellenistic period. As this portion of the coast is situated in 'Phoenicia', a term applied to the region by Greek writers in the 1st millennium BC, this discovery is of considerable significance. The data from the excavations offer potential for an insight into Phoenician commercial practices in their homeland of the coastal Levant. This subject remains mostly a *terra incognita*, especially for the Late Iron Age and Persian periods (1000-332 BC) (for general works on this topic see Bartolini 1999, 92-100; Elayi 1990; Markoe 2000, 93-107, 143-169). For the 1st millennium BC more is currently known about Phoenician commercial practices at sites across the Mediterranean and in Mesopotamia than within the homeland region.

The ceramic assemblage from the excavations at Sarepta comprises varying types of vessels, among which are sherds of carinated-shoulder amphorae. These are noted especially in strata dating to the 1st millennium BC. The first aim of this article is to investigate whether carinated-shoulder amphorae from these particular strata may have been manufactured at Sarepta. If that is the case, these amphorae can then be considered a Phoenician commodity, whose patterns of manufacture and distribution may reflect Phoenician economic strategies at this time. To achieve this aim I have analysed petrographically 30 carinated-shoulder amphora sherds from strata dating to the Late Iron Age and Persian period. I then assess whether the raw materials observed in the fabric(s) are consistent with a provenance in the vicinity of Sarepta. This study is conducted by correlating the observed raw materials with the mineralogical composition of geological and sedimentary formations in the region.

My second aim is to investigate the intra-regional distribution of these amphorae (i.e. their distribution within the southern coastal Levant). This investigation is based on the findings of a larger project which relates specifically to the production and regional distribution of carinated-shoulder

1 This article is part of a PhD completed at the Institute of Archaeology, University College London. The thesis is in process of publication.

2 Carinated-shoulder amphorae are also found at sites outside Phoenicia (eg. Lehmann 1996, Form 393-396; Sagona Types 2, 6, 8). Analysis of these amphorae is beyond the scope of this article.

amphorae of the Persian period (539-332 BC) in the southern coastal Levant [1]. At this time the southern borders of Phoenicia extended as far south as Ashkelon. In my doctoral research I sampled over 300 amphorae from 21 sites in the southern coastal Levant, from Sarepta in the north to Ashkelon in the south (Fig. 1). The sites include:

a) Major multi-functional cities over 50 acres: Dor, Akko, Ashkelon and Ashdod.

b) Secondary settlements of between 10 and 30 acres: Tell Abu Hawam, Jokn'eam, Tell Keisan (with its food storage role), Tel Michal (and its fort) and Sarepta.

c) Small sites of less than 10 acres with specialist functions: Ashdod fort, Tell el-Hesi (a fort and storage depot), Shiqmona and Tel Megadim (coastal towns with military and storage function), Gilam and Tel Mevorakh (both agricultural estates), Tel Qiri (an agricultural settlement linked to Jokne'am), Atlit (tomb L/16), Lohamei Hageta'ot (cemetery), Ma'agen Mikhael (a shipwreck) and Qiryat Ata (a 'picnic' site?).

My aim, with this distribution analysis, is to identify the intra-regional distribution pattern of amphorae whose provenance is posited as Sarepta to determine to what extent these ceramic containers were being manufactured for intra-regional distribution, or whether their production, was geared mainly for domestic consumption [2].

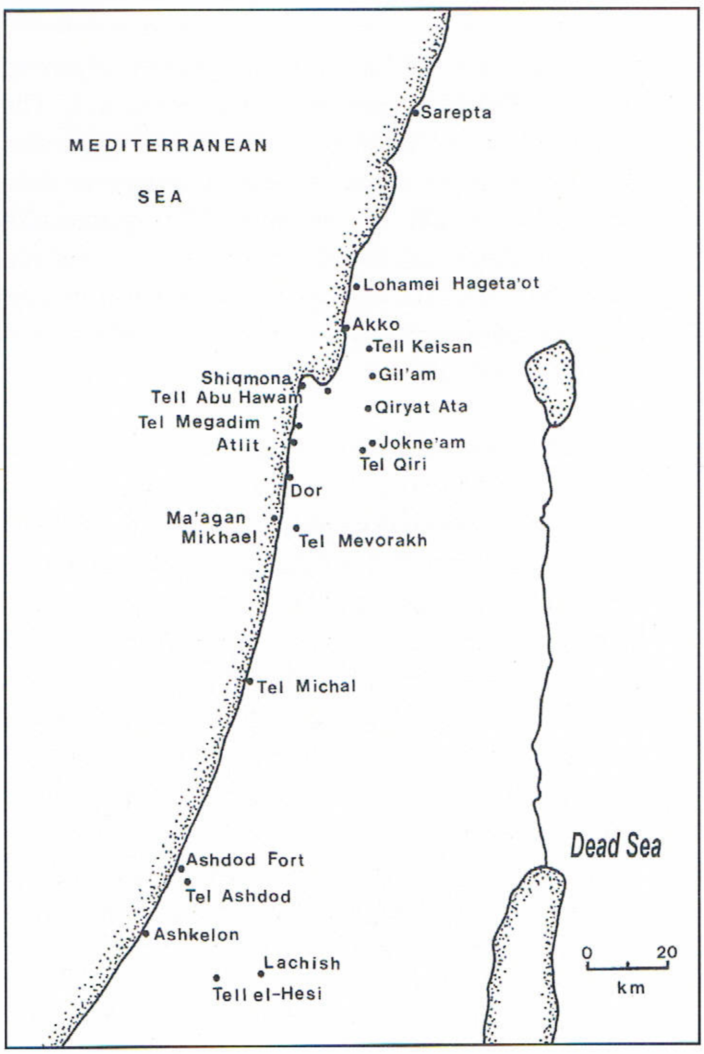
My final aim is to discuss the possible distribution mechanism of those amphorae which occur at sites along the southern coastal Levant. The possibilities I examine include:

a) Independent mechanism, where private individuals controlled distribution of a commodity on the basis of a demand-led economy (i.e. reflecting the presence of market forces).

b) State-sponsored distribution where amphorae are distributed through a state institution and distributed to state-associated localities.

c) A situation where both of the above mechanisms might be operating concurrently in the same region.

This investigation is based on a development of the model presented by Peacock and Williams in their studies on the regional distribution of Roman pottery (Peacock and Williams 1986, 61-63). The hypothesis they offer is that state-control or market forces distribution can be identified archaeologically according to the nature of the find-spots of



1. **The 21 sites where Persian period ceramic assemblages from excavations have been studied.**

artefacts. They suggest that state-control of the distribution of a specific commodity is indicated by their presence at sites which possessed a specific function likely to have served the state's needs. Thus one would expect that commodity to occur predominantly at find-spots such as palaces, forts or state-controlled storage depots. It would not be found, in great numbers at least, at other localities such as villages, towns, and lower class residential areas of cities with which the elite of the state would have relatively little connection.

The presence of a market-force redistribution economy, where distribution of the commodity is conducted through the activities of independent entrepreneurs would, they suggest, be reflected by a distribution pattern which was regionally more widespread. Their assumption is that '*a fairly diffuse distribution within the economic marketing zone, with finds occurring on a great number of different classes of site' reflects a pattern of market trading* (Peacock and Williams 1986, 61). This demand-led distribution would encourage entrepreneurs to serve consumer needs, wherever these consumers might be located. This commodity would therefore be found at settlements of varying sizes and function and would be present in contexts of deposition which were associated with elites and non-elites.

One weakness of this model is that archaeological evidence which might indicate an independent distribution mechanism could mask the co-existence of a state-controlled mechanism. In a situation where a commodity is found at most localities in a region one cannot be certain whether its presence at state-associated institutions, such as military installations and palaces, is due to private entrepreneurs or whether they were distributed through a state-controlled mechanism. One then has to consider whether there are any other sources of evidence, particularly historical sources if they are available, which might indicate that a state-controlled mechanism was operating in the region at the time.

The data concerning the Sarepta material on which this investigation is based derive from the ceramic assemblage and clay samples which are held in the storerooms at the University Museum of the University of Pennsylvania, USA. I would like to acknowledge the kind permission of the University Museum for allowing me access to this material for study, and for permission to take samples for petrographic and chemical analysis. I would also like to thank Dr. W. Anderson and his wife Jean, who so kindly entertained me in their home to discuss the excavated ceramic assemblage from Sarepta.

SAREPTA: A POTTERY MANUFACTURING CENTRE WITHIN SOUTHERN PHOENICIA

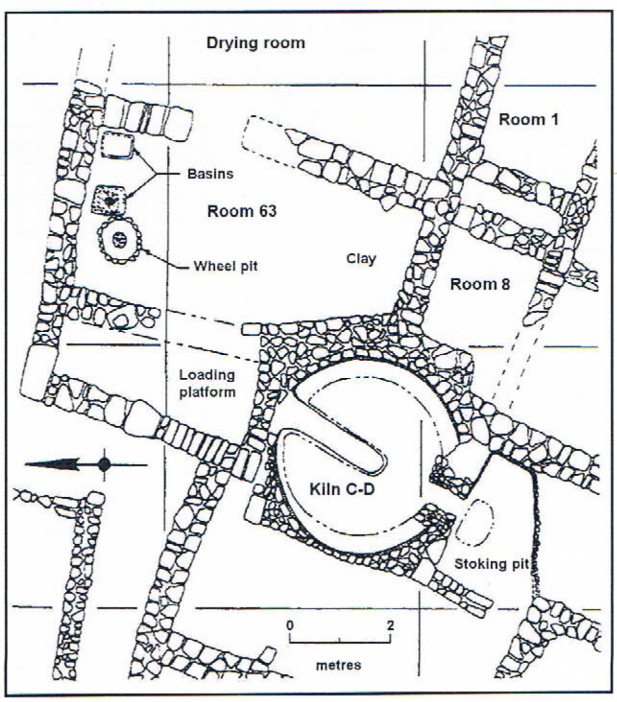
In the Late Bronze Age, Sarepta was an independent city-state in a region which is commonly termed Canaan. By the Iron Age, when the region is termed 'Phoenicia' by most scholars, Sarepta came under the domination of its two wealthier and more powerful neighbouring sister-cities, firstly Sidon and then Tyre. The prism of the Assyrian king Sennacherib (704-681 BC) states that, at the end of the 8th century BC, Luli, king of Sidon [3] controlled numerous settlements including '*Great Sidon, Little Sidon, Bit-Zitti* (*Zayta*), *Zaribtu* (Sarepta), *Mahallibu, Ushu, Achzib, Akko*' (Luckenbill 1927, II, 119). When Sidon rebelled against Assyrian rule in 677-676 BC Sarepta was handed to the king of Tyre on command of the Assyrian king, Esarhaddon (Parpola and Watanabe 1988, no.5). According to the *Periplus* of Pseudo-Scylax, a text compiled in the 4th century BC, Sarepta was still under Tyrian jurisdiction at this time (Galling 1938; 1964; Müller 1882; Stern, M 1984). In this text several cities along the southern coastal Levant, including Sarepta, are described as being a '*city of the Tyrians*' (Müller 1882, 78-79).

The archaeological excavations conducted at Sarepta in the 1970s have uncovered a material culture which amply reflects the Phoenician nature of this settlement. Part of the city was constructed using the pier and rubble construction technique characteristic of Phoenician settlements (Sharon 1987, 37-39; Stern 1992; van Beek and van Beek 1981). The Phoenician language was used in the settlement, as is attested by Phoenician inscriptions on the outer walls of pottery vessels and on a scarab (Pritchard 1978, 97-110; 1988, 8-9; Teixidor 1975). Phoenician deities were worshipped in the city. The name of Tanit-Ashtarte occurs on an ivory plaque (Pritchard 1978, 104) and the name Shadrapa, a deity known from Amrit, is also found (Pritchard 1978, 100). Phoenician cult practices took place in the settlement, indicated by the discovery of a clay face mask (Pritchard 1978, Fig. 88).

The excavations further revealed that Sarepta was a city which had possessed a significant industrial role. The remains of a pottery manufacturing centre which dated from the mid second millennium BC to the Early Hellenistic period were uncovered. The quantity of remains associated with pottery production indicates that, by the 1st millennium BC, it was '*an extensive and intensive commercial enterprise*' (Anderson 1989, 197). In an area of 800 m^2 the remains include 22 kilns, settling basins, prepared clay, wasters, unfired vessels, tools, and wheel emplacements (Anderson 1989, 199). The excavators estimate that, in total, '*the ceramic industry at Sarepta may have occupied in excess of 3,000 m^2*' (Anderson 1989, 199). They judge that more than 100 kilns and their workshops may have operated during the city's history, with several kilns in operation concurrently. An absence of destruction layers, or clear signs of abandonment, suggests that ceramic production may have been continuous for over a millennium [4].

To the excavators, all indications point to this being an efficiently administered commercial enterprise which had the capacity to manufacture ceramic vessels on a large scale. Kilns were built with care, repaired and rebuilt. Kiln C-D, which the excavators date to the Persian period, had experienced three main periods of use and had undergone at least one major repair (Fig. 2). Associated with this kiln was a workshop with terracotta basins and wheel pits. Large quantities of wasters of amphorae (the site ceramicists use the term '*storage jars*' in the publications) were recovered from deposits contemporaneous with Kiln C-D. Kiln A-B may have also been in operation at the same time as this kiln. The number of possible settling basins provides further evidence for '*the production of a massive quantity of pottery*' in this area of the tell (Anderson 1987, 47). Until the assemblages associated with these kilns are published separately it is difficult to ascertain the diversity of vessel forms which were fired in these particular kilns [5].

2. Plan of workshop of Room 63 and Kiln C-D at Sarepta (adapted from Anderson 1987, Fig. 9).



3 For Luli being the king of Sidon and not Tyre, as is often stated, see Na'aman 1998.

4 Pritchard has suggested that an introduction of a new pottery tradition in the 9th century BC in Stratum D in Sounding Y could suggest a period of abandonment, though this could also reflect an influx of a new population with their own traditions (Pritchard 1975, 70).

5 As pottery reconstruction was not the main priority during excavations (Anderson, pers. comm.), relatively few whole vessel profiles are known from this site. For the profiles of published carinated-shoulder amphorae see Pritchard 1975, Fig. 23:17-20; 24:1, 3-5.

Amph. no.	Field Reg. no.	Stratum	Area/Square	Level	Context description	Context date (centuries BC)	Fabric	Core colour	Outer zones colour	Exterior colour	Rim diam.	Rim ht.	Shoulder length
SR:1	A2-8	A2; 4?	Y-A2; II-K-20	4?	Residential area	4/later	**FC 1A**	2.5 YR 6/6 'orange'			12	0.7	
SR:2	A2-9	A2; 4	Y-A2; II-K-20	4	Residential area	4/later	**FC 1A**	2.5 YR 6/6 'orange'			10	0.9	
SR:3	A2-10	A2; 4	Y-A2; II-K-20	4	Residential area	4/later	**FC 1A**	5 YR 6/6 'orange'			10	0.6	
SR:4	B1-45	B1; 3	Y-B1; II-L-21	3	Residential area	6/5?	**FC 1A**	2.5 YR 6/6 'orange'	10 YR 7/3 'dull yellow orange'	10 YR 8/4 'light yellow orange'	11	0.6	
SR:5	B1-46	B1; 3	Y-B1; II-L-21	3	Residential area	6/5?	**FC 1A**	5 YR 6/6 'orange'		10 YR 8/4 'light yellow orange'	12	0.7	
SR:6	B1-48	B1; 3	Y-B1; II-L-21	3	Residential area	6/5?	**FC 1A**	5 YR 6/6 'orange'			10	0.8	
SR:7	B1-54	B1; 3	Y-B1; II-L-21	3	Residential area	6/5?	**FC 1A**	5 YR 5/1 'brownish grey'	2.5 YR 6/8 'orange'	as outer zones	10	1.3	
SR:8	B1-44	B1; 3	Y-B1; II-L-21	3	Residential area	6/5?	**FC 1A**	5 YR 6/6 'orange'	7.5 YR 8/4 'light yellow orange'	as outer zones	11	0.7	
SR:9	B1-4/5a	B1; 4	Y-B1; II-L-20	3	Residential area	6/5?	**FC 1A**	2.5 YR 6/6 'orange'	10 YR 7/4 'dull yellow orange'	as outer zones	10	0.6	5.6
SR:10	B2-3	B2; 4	Y-B2; II-K-20	4	Residential area	6/5?	**FC 1A**	5 YR 6/6 'orange'			10	0.9	7.0
SR:11	B2-17	B2; 11	Y-B2; II-K-20	4	Residential area	6/5?	**FC 1A**	5 YR 7/6 'orange'		10 YR 8/4 'light yellow orange'	11	0.8	
SR:12	B2-71	B2; 4	Y-B2; II-K-21	4	Residential area	6/5?	**FC 1A**	5 YR 7/6 'orange'		10 YR 8/4 'light yellow orange'	10	0.5	4.6
SR:13	B2-46	B2; 4	Y-B2; II-L-21	4	Residential area	6/5?	**FC 1A**	5 YR 7/6 'orange'			9	0.7	4.2
SR:15	B2-66	B2; 4	Y-B2-B1; II-K-21	4	Residential area	6/5?	**FC 1A**	5 YR 6/6 'orange'			11	0.6	7.5
SR:16	B2-76	B2/B1; 4	Y-B2/B1; II-K-21	4	Residential area	6/5?	**FC 1A**	2.5 YR 7/8 'orange'			11	0.6	
SR:17	B2-84	B2/B1; 4	Y-B2/B1; II-K-21	4	Residential area	6/5?	**FC 1A**	2.5 YR 6/6 'orange'			11	0.8	
SR:18	B2-86	B2/B1; 4	Y-B2/B1; II-K-21	4	Residential area	6/5?	**FC 1B**	7.5 YR 7/4 'dull orange'		10 YR 8/3 'light yellow orange'	12	0.8	
SR:19	B2-89	B2; 4	Y-B2; II-K-21	4	Residential area	6/5?	**FC 1A**	2.5 YR 6/6 'orange'		10 YR 8/3 'light yellow orange'	11	1.0	3.8
SR:20	B2-93	B2/B1; 4	Y-B2/B1; II-K-20	4	Residential area	6/5?	**FC 1A**	5 YR 6/6 'orange'		10 YR 8/4 'light yellow orange'	11	1.0	
SR:21	B1-51	B1; 3	Y-B1; II-L-21	3	Residential area	6/5?	**FC 1A**	5 YR 6/6 'orange'		10 YR 8/4 'light yellow orange'	13	1.1	
SR:22	C1-52	C1; 5	Y-C1; II-L-21	5	Residential area	M9-M7	**FC 1A**	7.5 YR 7/4 'dull orange'			11	0.6	
SR:23	C1-356	C1; 12	Y-C1; II-L-20	12	Residential area	M9-M7	**FC 1A**	7.5 YR 7/4 'dull orange'	2.5 YR 6/6 'orange'	7.5 YR 8/4 'light yellow orange'	9	0.8	
SR:24	452-47	4	X; II-A-9	4	Room 58 in industrial quarter	E9-M4	**FC 1A**	2.5 YR 6/6 'orange'		10 YR 8/4 'light yellow orange'	10	1.0	6.5
SR:25	452-46	4	X; II-A-9	4	Room 58 in industrial quarter	E9-M4	**FC 1A**	10 R 6/8 'reddish orange'		10 YR 8/3 'light yellow orange'	10	1.0	
SR:26	449-3	4	X; II-A-9	4	Room 57.4 in industrial quarter	E9-M4	**FC 1A**	10 YR 6/2 'greyish yellow brown'	2.5 YR 6/6 'orange'	10 YR 8/4 'light yellow orange'	10	0.7	
SR:27	452-57	4	X; II-A-9	4	Room 58.4 in industrial quarter	E9-M4	**FC 2D**	10 YR 7/4 'dull yellow orange'		7.5 YR 7/3 'dull orange'	9	0.2	8
SR:28	456-5	4	X; II-B-9	4	Room 61 in industrial quarter	E9-M4	**FC 1A**	2.5 YR 7/8 'orange'			11	1.3	
SR:29	452-41/42	MV	X; II-A-9	MV	Room 58.4 in industrial quarter	E9-M4	**FC 1A**	5 YR 6/6 'orange'		10 YR 8/4 'light yellow orange'	10	1.1	6.5
SR:30	452-62/63	MV	X; II-A-9	MV	Room 58.4a in industrial quarter	E9-M4	**FC 1A**	10 R 6/8 'reddish orange'		7.5 8/4 'light yellow orange'	10	1.0	7.5

6 The ceramicists at Sarepta counted 1,135 amphora rim sherds from contexts in Period VIII in Sounding X (Khalifeh 1988, Appendix E, Table 9A) and 1056 from Strata B and C in Sounding Y (Anderson 1988, Appendix C, Table 9A). The number of amphora sherds from Stratum A is currently unknown.

7 As far as I am aware this amphora has yet to be scientifically analysed to ascertain whether it was manufactured locally.

8 Macroscopic and petrographic analyses point to these amphorae being manufactured on a fast wheel. This is suggested by the rhythmic grooves on the interior of the vessel walls and the strong preferred orientation to the body wall of inequant aplastic inclusions and vughs in the thin-sections.

9 The forms and dimensions of the Sarepta rim/shoulder fragments resemble those of sherds of FC 1A in ceramic assemblages at sites along the coast of present-day Israel. See Chapter 4 and Appendix III of the forthcoming publication of my thesis.

Sampling of amphora sherds from the Sarepta excavations

To analyse the carinated-shoulder amphorae from Sarepta, I studied the ceramic assemblage which is held for long-term storage in the museum storerooms in Philadelphia. This assemblage consists of rim/shoulder fragments which derive from both soundings on the tell (Soundings X and Y). Those vessels where the whole profile is extant remain in Lebanon. I examined 67 rim/shoulder sherds from amphorae which derive from contexts in Strata A-C in Sounding Y and from Strata II-A-B in Sounding X (Table 1). These strata are dated by the excavators from the Late Iron Age to the 4th century BC. They form an unknown proportion of the assemblage from strata of that date [6]. Thirty sherds were selected from these 67 for further analysis. They were selected on the basis of morphological and fabric variability, date and nature of context. The criteria of selection included differences in dimensions (e.g. height of rim and length of shoulder) as well as shape, and macroscopic paste characteristics (i.e. colour, texture, size and quantity of inclusions as seen through a x10 magnifying lens). Examples were chosen from Soundings Y and X. The contexts in Sounding Y, a more residential quarter, are dated by the excavators from 6th-4th centuries BC. Those from the industrial quarter of Sounding X are dated to broader time-span, from the 9th-4th centuries BC. Each sample was labelled individually with 'SR:' (an abbreviation for Sarepta) plus a number. The data concerning the 30 sherds selected for analysis, including the description of context of deposition, fabric class and colour, and dimensions of selected features, are presented in Table 1.

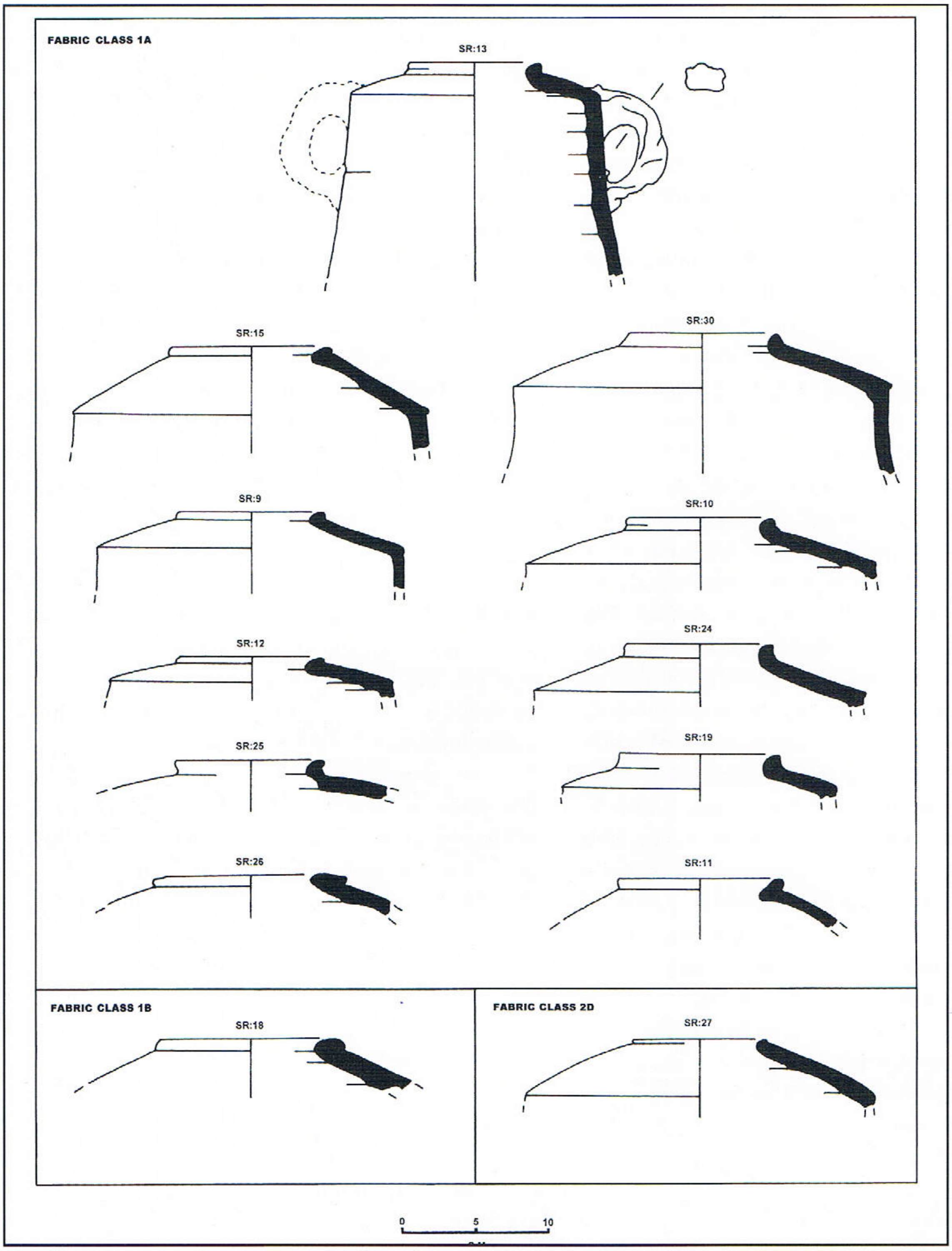
Typology of the sampled amphorae from Sarepta

A shoulder-carination is characteristic of ceramic bulk storage containers from the coastal Levant before the 1st millennium BC. 'Canaanite jars', which were the primary bulk container in the Eastern Mediterranean at this time, develop a shoulder carination accompanied by a flattened, sometimes almost horizontal, shoulder-wall from the end of the Late Bronze Age (e.g. Amiran 1969, 142, pl. 43:IIB; Leonard 1995; Zemer 1978, pl. 1:2-3). An example of a 'Canaanite jar' with a horizontal shoulder was uncovered during excavations near Kiln G at Sarepta, on the coast between Tyre and Sidon (Pritchard 1978, Fig.117) [7]. This carination feature is especially characteristic of ceramic assemblages which derive from Late Iron and Persian period strata in the coastal Levant (e.g. Lehmann 1996 Forms 380-406; Sagona 1982; Stern 1982, 107-110 'H' group). Among the sherds recovered from the Late Iron Age and Persian period strata at Sarepta are significant numbers from amphorae which exhibit this carinated-shoulder feature. They possess a simple short rim, a flattened shoulder with a carination where the shoulder is joined to the body and two handles (Anderson 1988, 189-200; Khalifeh 1988, 146-147; Pritchard 1988, Fig. 43).

A typology of rim forms of the carinated-shoulder amphora sherds sampled from this site is presented in Fig. 3. I do not include illustrations of all 30, as some are duplications of shape and size. The illustrations are arranged according to petrographically-determined fabrics (see below).

The rims of Fabric Class (FC) 1A are simple, where the potter has formed the rim by simply turning up the end of the shoulder slightly. In section the rims are usually either rounded, or slightly erect. The outer wall is sometimes flattened or indented, probably caused by pressure applied by the fingers of the potters when the vessel was being turned on the wheel [8]. Rarely, there is a rounded indentation on the inner wall where presumably pressure from a finger or thumb has been applied while the vessel was turned (SR:25). There is no neck and the shoulder walls are flat, or slightly convex. The height of the rims is consistently low, mostly between 0.5 and 1.1 cm. The shoulder length, in the examples where it is extant from the base of the rim to the point of carination, ranges between 3.8 and 7.5 cms (Table 1) [9].

The rim/shoulder sherd of the FC 1B sherd at Sarepta (SR:18) is similar in shape to those of FC 1A, though the rim is particularly well-rounded. This is probably a result of the softness of the chalk-rich matrix. The shoulder wall is also slightly thicker than that noted in the FC 1A examples. The rim of the FC 2D example (SR:27) is distinct from the examples of the other two fabrics as it is particularly low, at 0.2 cm. Its shoulder length is also comparatively long, at 8.0 cm.



3. Typology of rim/shoulder forms from Sarepta, grouped according to the petrographic fabrics differentiated: Fabric Class (FC) 1A; FC 1B; and FC 2D.

10 For a more detailed macroscopic and petrographic description of each fabric, and their chemical composition using ICP-AES and ICP-MS, see my forthcoming publication, Chapter 5 and Appendix VII.

11 Estimated terms of frequency used in this article are: rare = <1%; sparse = 1-9%; moderate = 10-24%; abundant = 25-40% - of the volume.

12 For the habitual presence of this genera of foraminifera in FC 1A, a genera significant for dating the deposition of the marl, see L. Grossowicz's report in Appendix V of my forthcoming publication.

Amphora fabrics

Fabric Class 1A

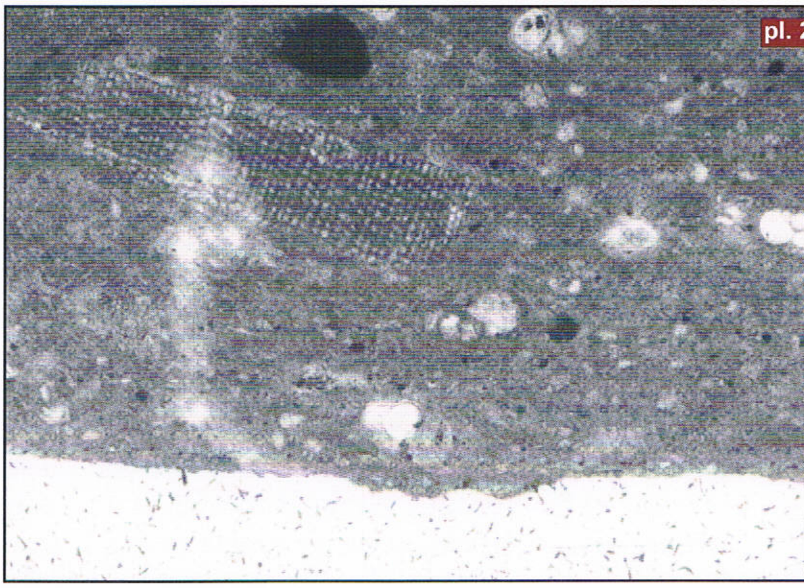
Of the 67 sherds examined macroscopically all except two (SR:18 and SR:27) are of the same fine, dense, orange fabric (see Table 1 for paste colours, using the Munsell colour system). I term this fabric FC (Fabric Class) 1A. Anderson confirmed that sherds of this orange fabric predominate in the excavated assemblage, being termed by him 'local ware' (W. Anderson, pers. comm.) [10] .

Macroscopic description: Macroscopically (using a x10 lens) this fabric is characterized by moderate to sparse amounts of transparent and translucent, well-sorted aplastic inclusions which are mostly of fine sand-size. There are also moderate multi-chambered microfauna of fine sand-size and sparse blobs or streaks of red iron oxide of medium to coarse sand-size. Cloudy pale yellow grains of limestone of very coarse sand to granule size are rare. Planar voids are moderate to rare, mostly up to 0.5 mm [11].

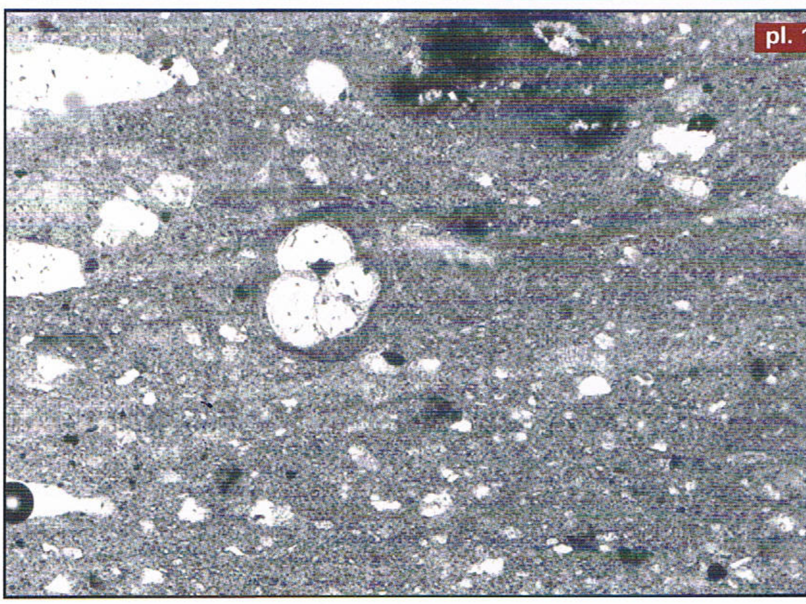
Petrographic description:

The matrix: The matrix consists of a fine-textured, dense, foraminiferous and ferruginous marl. The marl is a clear orange colour with numerous granules or streaks of ferric oxide which give a reddish hue. Streaks of fine, fossiliferous, calcareous clays with lower ferruginous content and pale grey/green colour are sometimes evident. Round, multi-chambered foraminifera present in the matrix are primarily globigerinidae of Palaeogene age, including *Acarinina* sp. (pl. 1) [12]. White mica flakes of very fine sand to silt size occur rarely.

Aplastic inclusions: These comprise c.2-5% of the volume. They consist predominantly of quartz grains, and microcrystalline and polycrystalline carbonate grains. The latter include intraclasts (micritic flakes or chips of carbonate-mud which can form along shores) (Tucker 1991, 112). Accessory minerals, including grains of hornblende, epidote and feldspar, chert and schist, and fragments of coralline algae, *Amphiroa* sp. occur rarely per thin-section (pl. 2). The aplastic inclusions in this fabric are predominantly subangular



pl. 2



pl. 1

pl. 1 Photomicrograph of FC 1A sherd (SR:8), general view with globigerinida in the centre, ppl, field width = c. 2.4 mm.

pl. 2 Photomicrograph of FC 1A sherd (SR:22), with fragment of coralline algae Amphiroa sp., ppl, field width = c. 0.97 mm.

to subrounded and rarely exceed 0.25mm in mean diameter, except for the microcrystalline carbonate grains which occasionally measure coarse to very coarse sand-size. A very rare example of grog is noted, of medium sand-size.

Proposed temper: Marl is usually a fine textured, highly plastic clay. Without aplastic inclusions marl would normally be difficult for potters to handle and the walls of larger vessels could collapse under their own weight while the vessel was being formed. From the consistent appearance of quartz and very rare accessory minerals, I propose that mature quartz-rich sand was added as temper to this fabric. The quartz grains observed are subangular to subrounded monocrystalline and comprise >95% of the coarse fraction. Accessory minerals in the temper probably include epidote and hornblende. Fragments of coralline algae *Amphiroa* sp. are also probably part of the temper as they display articulation, a feature of this genus which dates to the Pleistocene to Recent period (Johnson 1961). They are therefore not natural to a marl of Palaeogene age.

In size, the grains of quartz and accessory rarely exceed 0.25 mm in diameter. This could indicate that the temper had been well-sieved prior to being added to the paste. The grains are often observed as clusters or trails parallel to the vessel wall, as if hasty manufacture has led to an incomplete mixing of the paste, or as if the paste was dusted or rolled in quartz grains. This can be compared with modern-day practices of potters in the vicinity of Beirut where they roll the clay in fine quartz sand prior to forming vessels (Hankey 1968).

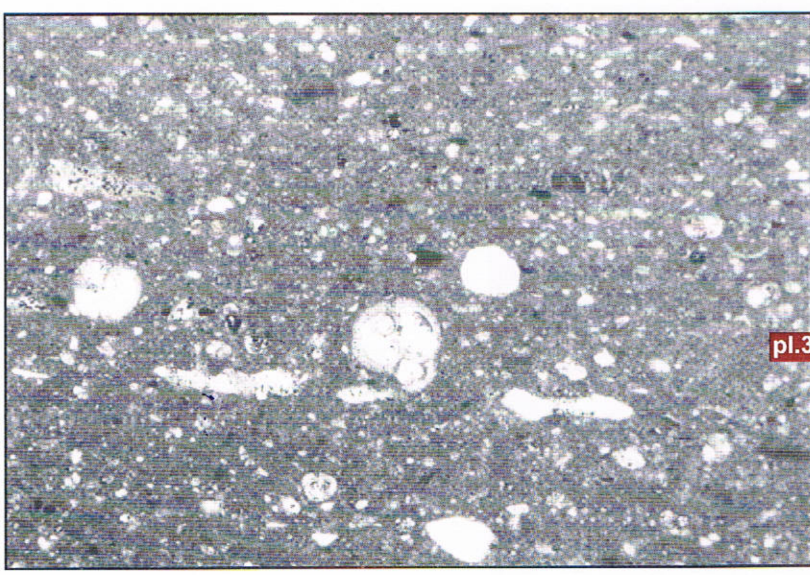
Subrounded pieces of grog (crushed pottery sherds), which cannot be natural to the clay, are rarely present in FC 1A. The scarcity of grog fragments suggests they may be the result of contamination during manufacture rather than being added purposefully by the potters.

Firing temperature [13]: The firing temperature of the 27 examples of FC 1A ranges from moderate, i.e. c. 650°-800° C (where outlines for the carbonate inclusions are well-defined and the matrix is optically active) to higher fired examples, probably a temperature somewhat exceeding 800° C. This temperature has been sufficient to cause an increasing translucence of the matrix and hornblende to alter to red oxyhornblende.

Fabric Class 1B

One sherd (SR:18) was identified as being of this fabric in the 30 sherds petrographically analysed.

Macroscopic description: This fabric is characterised by a very fine, dense matrix of very pale grey with a hint of orange colour. This colour is distinct from the bright red-orange of FC 1A. Subangular to subrounded inclusions form an estimated 10% of the volume, a greater proportion



pl.3

pl. 3 Photomicrograph of FC 1B sherd (SR:18), ppl, field width = c. 0.97 mm.

13 Firing temperatures are estimated through the visual characteristics of the matrix, which increases in opacity at higher temperatures, and the affect on colour and outline definition of certain aplastic inclusions of a higher firing temperature.

than in FC 1A, and they are well mixed into the paste. They are very well-sorted, of medium sand-size, and comprise translucent, transparent and dark brown grains. Unlike FC 1A, dull dark grey grains of medium sand-size are a prominent feature. The fabric lacks the diffused red iron oxides which are so characteristic of FC 1A. The matrix is relatively massive with rare planar voids parallel to the vessel wall.

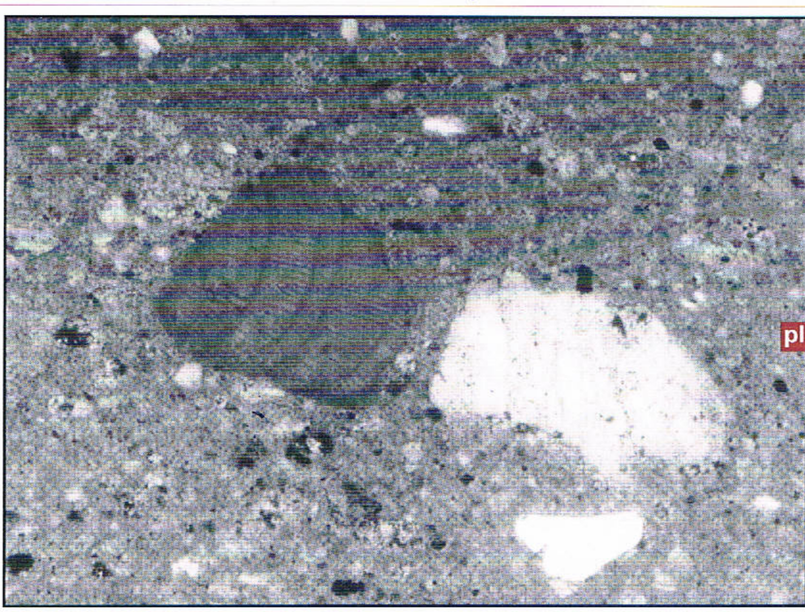
Petrographic description:

The matrix: FC 1B has a fine, dense matrix which is rich in chalk with abundant foraminifera, predominantly of Palaeogene age (pl. 3). The genera of foraminifera present are generally similar to those noted in FC 1A. Opaque nodules of pure iron oxide, dark brown in colour and mostly of fine sand size, are common to rare in the matrix, as are silt-size white mica flakes. Argillaceous inclusions of fine sand-size, with a dense, silty foraminiferous matrix, are very rare.

Aplastic inclusions: These form c.10% of the volume. Those in the coarse fraction comprise predominantly subrounded quartz grains and fragments of coralline algae *Amphiroa* sp. of fine to medium sand-size, slightly larger than those fragments usually observed in FC 1A (pl. 4); polycrystalline and micritic carbonate grains of fine to medium sand-size are sparse; and rare accessory minerals including orthoclase and plagioclase feldspar, epidote and hornblende and other siliceous components, including chert and quartzitic rock fragments, predominantly of fine sand-size.

Proposed temper: The temper in this fabric appears to be similar in composition to FC 1A, but varies in the proportions of the components and the size of grains. It usually forms c. 10% of the volume, which is twice the amount typical in FC 1A. The proposed temper consists mainly of quartz-rich sand with fragments of coralline algae, *Amphiroa* sp., in roughly equal quantities, and rare foraminifera fragments of more recent age than Palaeogene eg. *Rosalina sp.*(Haynes 1981, 259, 295, Figure 12.7:9.10) and *Elphidium* sp.(Haynes 1981, 263, Fig. 12.9:22/24). The quartz grains are mostly subangular to subrounded and they, and the coralline algae fragments, commonly measure up to medium sand-size, whereas those in Fabric 1A rarely exceed fine sand-size. Rarely, well-rounded quartz grains are observed (a feature not present in Fabric 1A). Their shape suggests a lengthy transport history or a polycylic origin. The grains in the coarse fraction can form trails in the wall section which may indicate that the temper was incompletely mixed into the paste, a feature also noted in FC 1A.

Firing temperature: The single example of FC 1B has been fired to a moderate temperature, i.e. c. 750-850°C. This is indicated by the slight decomposition of the calcareous fraction and carbonate inclusions, with the hornblende retaining its green



pl. 4

pl. 4 Photomicrograph of FC 1B sherd (SR:18), with fragment of coralline algae Amphiroa sp., xpl, field width = c. 0.97 mm.

appearance in plane polarized light.

Fabric Class 2D

One sherd of FC 2D was identified among the 67 sherds examined (SR:27)[14].

Macroscopic description

Macroscopically this fabric is distinctive as numerous glistening grains are observable on the outer surfaces of the fragment wall. This feature is often considered to indicate mica (e.g. Peacock 1977, 30-32). No such flakes are visible within the wall section. The matrix is very fine, dense, silty and of a light buff/brown colour. Well-sorted inclusions are commonly scattered throughout the matrix, and, unlike the other two fabrics, are predominantly dark coloured. They measure from fine to medium sand-size. Rarely, yellow carbo-nate grains or dark grains of very coarse sand-size are present. There are no apparent voids, and the vessel wall lacks a core.

Petrographic analysis

The matrix: the matrix of FC 2D is dense and of a calcareous clay which is light brown and silty (pl. 4). Silt-size inclusions in the matrix consist of common silt-size basalt fragments (a feature not seen in the other two fabrics), white mica flakes, pure opaques and rare foraminifera. No argillaceous inclusions are present in this sample.

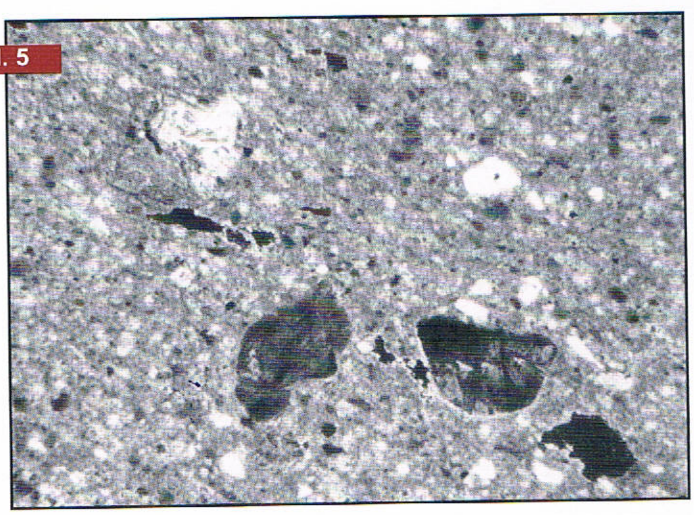
Aplastic inclusions: These form c.10% of the volume. In composition they differ substantially from the inclusions observed in FC 1A and FC 1B. They comprise mainly heavy mineral grains, including fibrous brown amphibole, clinopyroxene, orthopyroxene, altered olivine, biotite and opaques. Also present are volcanic fragments including altered basaltic glass and gabbro (pl. 5), dolerite, and an amygdale from a basalt (pl. 6). These clasts are subrounded and medium to coarse sand-size. Foraminifera (globigernidae) and mollusc fragments of fine to coarse sand-size are rare.

Proposed temper: The bimodal size of the grains, where the majority in the coarse fraction are medium to coarse sand-size, indicates that sand rich in basaltic fragments with a few microfossils was added as temper. This temper forms an estimated 15% of the volume. The basaltic clasts are mostly subrounded to rounded, reflecting a relatively lengthy transportation history from the parent rock. The temper appears to have been well mixed into the paste, with grains evenly distributed throughout the matrix.

Firing temperature: This sample was fired to a temperature estimated between 750°-850° C. This is indicated by the slight decomposition of the calcareous fraction of the matrix and the internal and outlines of the carbonate inclusions, while the matrix remains optically active.

A semi-quantitative summary of the aplastic inclusions and the assessment of firing temperature of each sherd of FC 1A and FC 1B from Sarepta is presented in Table 2; and that of SR:27, whose mineralogical composition differs from that of FC 1A and FC 1B, in Table 3.

pl. 5



14 This single example is the only example of this fabric among the 307 sherds gathered from 21 sites in the southern coastal Levant for my doctoral research.

15 With thanks to D. Griffiths for collecting these samples. For descriptions and photos of these sand samples see my forthcoming publication, Appendix VI.

16 In order to analyse this clay sample petrographically, water was added to the dried earthy particles and a brickette formed measuring 2.5 x 2.5 x 7 cms. This brickette was then fired for 71/2 hours in a kiln in an oxidising atmosphere at c. 750^{O} C, and then thin-sectioned.

pl. 5 Photomicrograph of FC 2D sherd (SR:27), with grains of altered basaltic glass and gabbro, xpl, field width = c. 2.4 mm.

Provenance analysis of the sampled amphorae

One significant aim for characterising amphora fabrics at Sarepta is to assess whether the raw materials in these three fabrics are consistent with their manufacture in that locality. Pinpointing an exact location as a source of raw materials through petrographic analysis is rarely possible. It requires identifying spatially limited geological outcrops with distinctive inclusions and a comprehensive sampling project of clays in the region. Identifying distinctive inclusions in outcrops can be especially challenging in the southern coastal Levant where sedimentary facies of similar mineralogical composition are found along the coast (e.g. Bartov 1994; Dubertret 1943, 1949, 1961; Sneh *et al*., 1998). My proposals for provenance are based on a combination of findings from petrographic analysis of amphora sherds, petrographic analysis of a clay sample taken from the vicinity of a kiln, and information regarding the quantities of each fabric in the ceramic assemblage at the site.

Provenance analysis of FC 1A

The raw materials in FC 1A are consistent with a coastal source in the vicinity of Sarepta. The matrix of FC 1A comprises foraminiferous marl of Palaeogene age. Outcrops of foraminiferous marl are widespread in areas of the coastal Mediterranean, though they vary in date of deposition. Geological maps reveal that outcrops of marl of Palaeogene age are exposed nearest the coast in the region between Sidon and the western Galilee coast (Sneh *et al.* 1998). The lithology in southern Lebanon is described as *'chalky-marly-globigerinal'*, with chalky Palaeocene formations overlain by 'cherty, marly, chalky limestones of the Lower Eocene, in turn overlain by *chalky Middle Eocene marls'* (Beydoun 1977, 332; Table II). The abundant presence of certain genera of foraminifera in FC 1A indicates that the paste comprises marl of this age. Most common among the foraminifera genera present in this fabric are globigerinida *Acarinina* sp. (pl. 1). This is a rounded, multi-chambered genus which existed for a relatively short period from the Palaeocene into the Eocene, becoming extinct at the Middle/Upper Eocene boundary (Corfield 1987; Haynes 1981, 318, 343; Figure 14.1, 14.2). Acarinina sp. has been recorded as abundant in Early to Middle Eocene calcareous formations in the southern coastal Levant (e.g. Benjamini 1980; 1995).

Fragments of coralline algae which occur in this fabric (the dull grey inclusions with cellular internal structure) are pieces of photosynthetic, non-vascular plants which inhabit almost exclusively an aquatic environment (pl. 2). Their presence is indicative of a coastal provenance. The genus present, *Amphiroa* sp., belongs to the Corallinaceae family of the red algae (rhophyta) group (Adams *et al.* 1984: 51 (116); Horowitz and Potter 1971:75-76; pl. 56(2)); Wray 1977:65). It is a genus noted for its articulation, with distinctive alternating layers of closely packed, heavily calcified filaments of long and short cells. Analysis of coastal sediments along the southern Levantine coast have confirmed the presence of this genus of coralline algae (e.g. Bakler 1989; Buchbinder 1975; Gavish and Friedman 1969; Sivan 1996). Sand samples collected recently from the shores near Sidon and Tyre have been found to include fragments of *Amphiroa* sp. [15] However, whether the composition of sand along these shores has remained constant over the two and a half millennia since these amphorae were manufactured is a topic which has yet to be studied.

Clay analysis from a pottery workshop

A further piece of evidence which supports the proposal that FC 1A is local to Sarepta derives from the petrographic analysis of a clay sample from Sarepta. This was collected from within a pottery workshop, Room 72, which is dated from 11th century BC to the 6th/4th centuries BC (Anderson 1987, 46-47; 1989, 200, Fig. 3). This sample came from level 5, which the excavators consider to be the final phase of building occupancy. According to the excavators' field notes entitled '*Sarepta Clay Samples*' this clay, which is yellow in colour, is described as '*potters' clay*'[16].

Petrographic analysis of this clay sample shows that it too comprises foraminiferous marl of

Palaeogene age. The matrix is highly calcareous with common or abundant microfauna, few ostracods and rare discrete calcite crystals. The foraminifera genera present appear to be the same as those observed in FC 1A sherds from other sites. The mineral inclusions in the clay include subangular quartz grains up to fine sand size, various foraminifera up to medium/coarse, including oxide-filled *Acarinina* sp., chalk to coarse sand size, microcrystalline limestone grains of granule size and very rare fragments of coralline algae *Amphiroa* sp., chert, and epidote to fine sand size. Compositionally and texturally, the aplastic inclusions in the 28 sherds of FC 1A resemble closely those of the clay sample.

The provenance of FC 1B

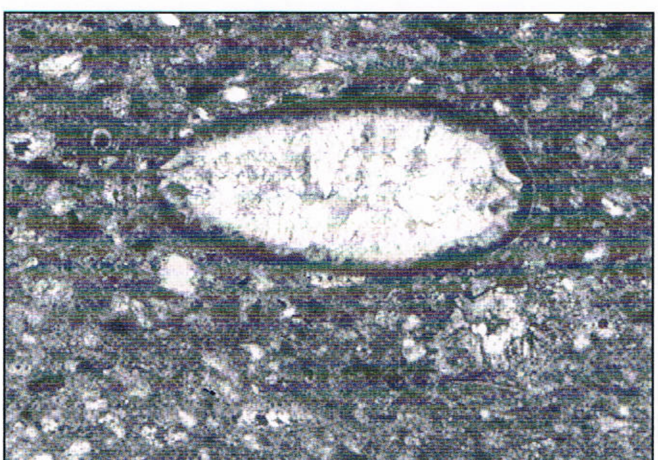
The raw materials in FC 1B are also consistent with a provenance along the coastal southern Levant. However, a source along the northern coast of Israel may be more likely than southern Lebanon. The chalk-rich matrix could derive from chalk outcrops of Palaeogene age which are widespread in this region (Sneh *et al.*, 1998). The presence of coralline algae *Amphiroa* sp., as stated above, denotes a source from an exclusively marine, shallow water environment of Pleistocene to Recent age, and it is observed among coastal sediments of northern Israel and southern Lebanon.

However, many of the 26 examples of this fabric analysed for my doctoral research (though admittedly not in the SR:18 thin-section) include tiny fragments of carbonate-cemented grains [17]. These are grains of monocrystalline quartz and microcrystalline carbonate which are cemented together with sparry calcite. Their presence is consistent with a source close to *kurkar* ridges, which are consolidated sand dunes (pl. 7). Kurkar ridges occur as discontinous parallel lines along the coast of Israel as far north as Rosh Ha-Niqra on the Israeli/Lebanese border (e.g. Gvirtzman *et al.* 1998; Horowitz 1979). If the carbonate cemented grains derive from these ridges one can propose that the source of this fabric is more likely to be in the coast of northern Israel. One cannot however discount the possibility that fragments of kurkar could have been transported northwards by longshore drift and wind to be mixed with the sediments along the coast of Lebanon.

A further point to note is that only one sherd of this fabric was observed among the 67 sherds studied in the retained ceramic assemblage. This rarity provides support for the proposal that this was probably an import to Sarepta[18] .

The provenance of FC 2D

This fabric is mineralogically distinct from FC 1A and FC 1B. Its raw materials derive from an area with ophiolites, rather than one comprising sedi-



pl. 6

17 See my forthcoming publication, Chapter 5.

18 The distribution pattern of amphorae of this fabric apparently clusters in sites south of Haifa Bay, suggesting the source may be in this area. See forthcoming publication, Chapter 7.

19 Amphorae of FC 1A also appear at sites outside the southern coastal Levant but a study of these amphorae is beyond the scope of my current research.

20 Ashdod, Lachish and Tell el-Hesi were probably outside southern Phoenicia. See my forthcoming publication Chapter 3 for a more detailed analysis of the territorial boundaries of southern Phoenicia in the Persian period.

pl. 6 Photomicrograph of FC 2D sherd (SR:27), with an amygdale filled with sparry calcite, xpl, field width = c. 0.97 mm.

mentary facies, as is noted with FC 1A and FC 1B. The presence of ophiolites is not consistent with a source in the southern coastal Levant unless raw materials from an area with ophiolites were imported into the region. The inclusions of altered basaltic glass and basaltic clasts and the heavy mineral suite indicate that the matrix and the aplastic inclusions in this fabric derive from mafic volcanic and plutonic rocks. The amygdale of sparry calcite (pl. 6) indicates that lavas occur in the source area (Mackenzie *et al.* 1982, 71-72). In addition there is evidence that low-grade metamorphism has affected the source region. The plagioclase in a gabbro clast has been replaced by a radiating growth of prehnite (pl. 5) (Deer *et al.* 1992, 386). The source region is also probably coastal, as is indicated by the presence of foraminifera and shell fragments. This combination of constituents would be consistent with a source along the coast of the northern Levant, especially in the Hattai region, or possibly Cyprus. If the source is a manufacturing centre located in the Hattai region, one wonders if the manufacturing centre is to be located in the vicinity of Al-Mina or Myriandros, both of which are known from numismatic and textual evidence to have connections with Phoenicia. Without analysis of the geology and sediments in this area, however, this is speculation.

As SR:27 is the only example of this fabric in the ceramic assemblage studied, it could be that amphorae of this fabric were imported into Sarepta relatively rarely.

Amphora manufacture for intra-regional distribution

From the above examination of archaeological remains and analysis of amphora fabrics it seems that Sarepta was a major pottery manufacturing centre which, in the mid 1st millennium BC, was involved in the manufacture of amphorae using local foraminiferous marl. One then may ask to what extent was production geared for export across the homeland region of the southern coastal Levant, or was it mainly for domestic consumption? The citizens of Sarepta certainly used their own amphorae as sherds of FC 1A are found in the residential areas of Sounding Y (Table 1). Unfortunately, it is less easy to answer to what extent these amphorae were distributed to the neighbouring major cities of Tyre and Sidon. Late Iron and Persian period strata at Tyre have yet to be excavated, presumably lying beneath the modern city. At Sidon pottery of this date awaits publication. Nevertheless, there is evidence from sites further south which indicates that these amphorae were not only manufactured for domestic consumption. Analyses of carinated-shoulder amphorae from excavations at 21 sites in the coastal region to the south of Sarepta (see Fig. 1) reveal that, during the Persian period, amphora production at Sarepta was geared to serving an intra-regional distribution network to settlements within southern Phoenicia (and beyond [19]).

According to contemporaneous historical sources of the Persian period the city-states of Tyre and Sidon each extended their territorial jurisdiction southwards to take control of settlements as far south as Ashkelon. According to the *Periplus* of Pseudo-Scylax, compiled in the 4th century BC, Tyre had control over the coastal cities of Paleotyre, Sarepta, Akhziv?, Akhshaf (Shiqmona?), a settlement whose name is lost and Ashkelon. Sidon meanwhile had jurisdiction over Ornithon, Adaros (Atlit?), Dor and Jaffa (Galling 1938; 1964; Müller 1882, Stern, M 1984). Herodotus, writing in the 5th century BC, claims that the southern border of Phoenicia at this time was situated '*as far as the borders of the city of Cadytis*' (Gaza) (Herodotus Histories III, 5 – Godley transl.). Most of the 21 sites studied were probably within these extended borders of Tyre or Sidon, or were very close to their borders [20]. The distribution analysis of the sampled carinated-shoulder amphorae therefore comprises what is predominantly an intra-regional analysis in southern Phoenicia.

Petrographic analysis of 307 carinated-shoulder amphora sherds from these sites resulted in the differentiation of eight fabrics, one of which is FC 1A. According to a presence/absence analysis of fabrics at each sampled site, the FC 1A amphorae exhibit an intra-regional distribution pattern which is unique among amphorae of these eight fabrics. Whereas all the other fabrics show clustering in certain areas of the southern coastal Levant, fragments of FC 1A are ubiquitous, occurring at every site sampled[21]. They are therefore to be found at major multi-functional and secondary settlements, and sites of specialist function (military establishments, storage depots and cemeteries). They occur at sites on the coast and at sites up to about 25 km inland.

If Sarepta was the only place in the region where carinated-shoulder amphorae of FC 1A were manufactured, one can understand that the scale of production at the centre would have had to be substantial to adapt to meet this regionally widespread demand. This distribution pattern would help to account for the number of kilns and workshops operating simultaneously and the piles of amphora wasters at Sarepta in contexts dated to the mid 1st millennium BC. It would also explain why the use of the fast wheel was imperative to manufacture vessels quickly and in quantity. It would seem the potters were responding to a demand for their amphorae which emanated from across the region.

Admittedly, one cannot discount the possibility that potters at other manufacturing centre(s) in this region could have used foraminiferous Palaeogene marl to produce carinated-shoulder amphorae. Outcrops of marl of this type and date are exposed near the shoreline from south of Ṣidon to the coast of Western Galilee. To the south of Haifa Bay the outcrops become increasingly distant from the coastline (see geological maps by Bartov 1994 and Sneh *et al.* 1998). A source in that area is less likely as one would not expect a manufacturing centre involved in the large-scale production of a container with a significant maritime transportation role to be produced far from the coast. It is noteworthy that during the examination of the shape, size or manner of forming of the 162 amphorae of FC 1A in my research sample I have been unable to detect different workshop manufacturing traditions which might indicate that more than one manufacturing centre of FC 1A amphorae existed in the Persian period.

The distribution mechanism of FC 1A amphorae

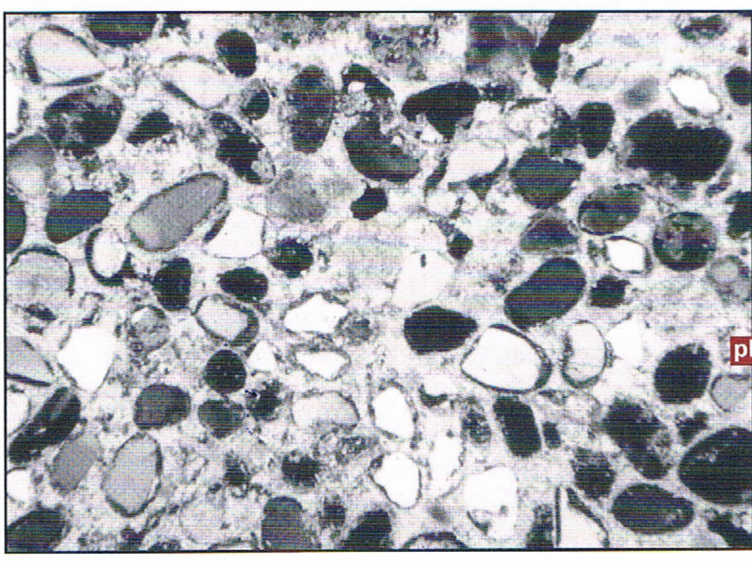
According to the model presented by Peacock and Williams (1986, 61-63), mentioned above, a widespread distribution of a certain type of pottery would be characteristic of distribution through an independent mechanism, i.e. through the actions of private entrepreneurs whose trading routes across a region could enable a commodity to reach a wide diversity of localities. This model suggests that market-forces are in operation and that the distribution networks are led by a demand for the commodity. The ubiquity of amphorae at every one of the 21 sites sampled would be consistent with this model. It indicates that the distribution network was highly effective at reaching all types and sizes of settlements, including those which possessed no obvious attachment to the state. The implication is that numerous private individuals were involved in this intra-regional distribution. It is known from historical sources that private individuals were able to acquire great wealth through commercial activities. Diodorus Siculus, writing in the 4th century BC, states that Sidon's *'private citizens had amassed great riches from its shipping'* (Diodorus Siculus XVI.41.6). The Hebrew writer Isaiah, when describing events in the late 7th and early 6th centuries BC, claimed that private individuals in Tyre, whose commercial activities across the Mediterranean had made the city immensely wealthy, possessed riches which rivalled that of princes (e.g. Isaiah 23:8). One could hypothesise that part of this wealth could have derived from the distribution of amphorae, and their contents, to settlements on the shores and coastal plain of the southern coastal Levant.

On the other hand, if one looks again at this distribution pattern, there is nothing to discount the possibility that some were distributed through a state distribution mechanism. In this type of mechanism the expectation would be that the commodity would be found at sites which served the state's needs. Such a distribution network would therefore include palaces, state depots and military establishments. The commodities would not be expected to occur at most of the smallest towns and villages which had no obvious palatial or imperial connection. This distribution mechanism would be part of the state's strategy to ensure its perpetuation by sustaining those people involved in state-sponsored activities [22].

Such a state-sponsored mechanism is attested within the Persian empire. The Persepolis Fortification tablets record the existence of a highly complex redistribution system in the imperial heartland from the 13th to the 28th year of Darius (509-494 BC) (e.g. Apergis 1998; Hallock 1969; 1985; Lewis 1990). The quantities in which the foodstuffs were stored and disbursed are recorded in detail, plus who would receive them and sometimes for what purpose. Although most of the details relate to the Persian heartland, the tablets reveal that food and drink were stored at depots across the empire and distributed to those employed in the King's service. Tablet PF 1551, for instance, concerns the arrangements for provisions for men travelling from India to Persia, ensuring they were provided with wine rations. Achaemenid kings had way-stations established for this purpose along main routes across the empire, a day's journey apart, to provide food and drink to those with the necessary sealed documents (e.g. Herodotus *Histories* VIII, 98; Xenophon *Anabasis* III, 4.31; Driver 1957, VI).

In the 5th satrapy (province) of the Persian empire, of which Phoenicia was a part, government officials are recorded as receiving food rations, including oil and wine, which must have been stored in state-administered magazines. According to Nehemiah, governors and the elite in Israel regularly received such rations under Persian imperial rule. He claims that, ' ... a *hundred and fifty Jews and officials ate at my table, as well as those who came to us from the surrounding nations. Each day one ox, six choice sheep and some poultry were prepared for me, and every ten days an abundant supply of wine of all kinds. In spite of all this, I never demanded the food allotted to the governor'* (Nehemiah 5:17 - New International Version). According to Ezra, supposedly an official of King Artaxerxes, he was granted '*up to a hundred talents of silver, a hundred cors of wheat, a hundred baths of wine, a hundred baths of olive oil, and salt without limit'* from the treasury of the 5th satrapy (Ezra 7:21 - New International Version).

Military personnel in the provinces were also afforded food rations from state-controlled storehouses. Achaemenid kings took careful note of the imperial reserves for military manoeuvres across the empire and the regular provisioning which maintained local garrisons (Briant 1988, 171). For imperial military personnel on the move, it was usual for them to obtain food supplies from the localities through which they were passing (Herodotus *Histories* VII.119). Soldiers who manned garrisons were provided with food from subject territories (Xenophon, *Cyropaedia* VII.5.69). Ostraca from Arad and Beer Sheva and others from the province of Idumea, which lay to the south-east of Phoenicia, indicate that food-



pl. 7

pl. 7 Photomicrograph of a fragment of kurkar gathered from a ridge near Dor, Israel, xpl, field width = c. 0.97 mm

21 Some site excavation reports (e.g Tell Abu Hawam and Lachish) state that amphora sherds of the bright orange fabric characteristic of FC 1A are recovered in large quantities in Persian period strata.

22 For further discussion on the theories concerning state controlled and independent modes of commodity distribution see Brumfiel and Earle 1987; Clark 1995; Costin 1991; Stein 1994.

stuffs were being transported to and from central storehouses in that region (Lemaire 1996, 2000, 140; Naveh 1973; 1979; 1981). Those from Beer Sheva indicate the foodstuffs may have been brought to this administrative centre as tax payments, while those from Arad relate to what appears to be a military site. Similar ostraca apparently recording allocations of wine and oil were found in a storehouse in an Iron Age fort at Samaria, suggesting that this administrative centralization and distribution of liquid foodstuffs was a feature of the region prior to the Persian period (Rosen 1986/1987).

In conclusion, the regional distribution pattern of amphorae of FC 1A is consistent with the involvement of private individuals in the distribution process. Nevertheless, drawing on textual sources of the Persian period as well as the amphora distribution pattern, there is also the possibility that some amphorae could have been distributed to state-associated establishments through a state-sponsored mechanism. Thus the presence of carinated-shoulder amphorae at such localities as the forts at Ashdod, Shiqmona, Tell Michal and Tell el-Hesi, the food storage depots at Tell Keisan, Tel Megadim and Tel Mevorakh and the palace at Lachish could be explained as the consequence of a state-sponsored distribution mechanism. I propose that both distribution mechanisms may have been in operation concurrently in southern Phoenicia during the Persian period.

Final comments on the findings

The above investigation reveals that carinated-shoulder amphorae of FC 1A were manufactured at Sarepta in the mid 1st millennium BC. Thus these amphorae may, with some scientific justification, be termed a Phoenician commodity. I propose that the potters extracted clay from outcrops of marl in the vicinity of the tell and lightly tempered the paste with quartz-rich sand from the shores nearby, although clays and sand local to Sarepta need to be analysed to test this hypothesis. The potters appear to have used these raw materials consistently during the 1st millennium BC. Once manufactured, these amphorae were distributed throughout southern Phoenicia in a blanket distribution network which reached consumers at settlements of varying types and size. It is clear from this investigation that a considerable demand existed for carinated-shoulder amphorae across the southern coastal Levant in the Persian period. Many reasons could be offered for this demand. One might be its relative effectiveness as a liquid container. Marl possesses a matrix whose fineness and density make the fabric relatively impermeable once fired. It would be more effective than those amphorae made of clay with a silty matrix, a type of clay employed in at least four other pottery manufacturing centres along the coastal Levant at this time[23].

For the potters too, there were benefits in large-scale manufacture of vessels using marl. The calcareous-rich matrix and the relatively high levels of ferric oxide act as a flux, causing sintering to commence at a moderate temperature. Vessels of marl would thus require comparatively less fuel for firing to achieve a relatively efficient liquid container. The marl itself could be worked easily on the fast wheel. Only a relatively small quantity of aplastic inclusions (in this case, quartz-rich sand) was apparently needed to counteract slightly the plasticity of the marl while the vessel was being shaped. The plasticity of the paste also enabled the potters to manufacture amphorae with walls which are relatively thin. Examples of amphorae of FC 1A where the body wall is extant usually measure 0.6-1.1 cm [24]. Roman amphorae, by comparison, possessed walls which could be c.2 cm thick (Will 1977, 265). A relatively thin body wall results in a comparatively light amphora which could be carried by a single person with relative ease, even when filled with liquid, unlike the more substantial basket-handle amphorae which needed two men to lift them. Thus these amphorae would have been relatively quick and cheap to produce, and the product itself would have been relatively effective as a bulk container of liquids and easy for individuals to transport.

A question which has not been answered so far concerns the contents of amphorae of FC 1A. One must remember that in any distribution analysis of amphorae one is likely to be examining more the distribution of their contents rather than the vessels. At present the contents of these amphorae remains uncertain and residue analysis needs to be conducted to help resolve this question. Wine and olive are both good candidates if the amphorae were being filled anywhere in the southern coastal Levant. The soil and climate in this region are highly effective at growing vines and olive trees in profusion. There is archaeological and historical evidence which indicates that both olive oil and wine were produced in the district around Sarepta which would have required bulk ceramic containers. Olive oil presses have been uncovered at Sarepta in strata dating to the Hellenistic period (Pritchard 1978, 129-130). Sidonius Apollinaris mentions wine from Sarepta, stating '*Gazetic, Chian, nor Falernian wine have I, drink then of the Sareptan vine'* (cited by Pritchard 1978). Sareptan wine is also referred to in a text written in the 6th century AD (Mayerson 1993, 169).

Whether these amphorae were intended to store one specific type of liquid, or whether they were multi-functional and were meant to hold a number of different liquids during their life-span, is an unresolved question. Additionally, whether these amphorae were filled with liquid foodstuffs produced at Sarepta, or whether they were transported empty to be filled at other settlements in the region, is unclear. Nevertheless, this investigation reveals that carinated-shoulder amphorae manufactured at Sarepta played a significant role in the distribution of liquid foodstuffs throughout southern Phoenicia. Their ubiquitous presence at sites across the region indirectly reflects the existence of a considerable demand for liquid foodstuffs in the mid 1st millennium BC. This emphasis on the large-scale production, distribution and storage of foodstuffs may be compared to similar findings concerning foodstuffs observed across the Eastern Mediterranean at this time (Sherratt and Sherratt 1992, 369-374).

23 Four fabrics with a silty matrix are present among the Persian period carinated-shoulder amphorae sampled in my doctoral research. See my forthcoming publication, Chapter 5.

24 For a table of selected amphora dimensions, including wall thickness, see my forthcoming publication, Appendix III.

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