Economic interdependence among urban communities of the Roman Mediterranean

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I

Roman historical sources and their modern interpreters have left us in no doubt as to the importance of a guaranteed supply of cereals to Rome from provinces other than Italy itself. The degree of dependence of other communities on food supplies obtained from beyond their immediate hinterland is far from clear. Yet, writing of the Hellenistic East, Rathbone has recently claimed: 'we cannot doubt that grain was one of the largest items of trade . . . both in terms of tonnage and in terms of value' (1983: 45). On the documentary evidence currently available to us there is reason to believe this to be true of the Roman period as well (cf. Hopkins 1983). Access to the sea with its potential for bulk transport at relatively low cost offered enormous advantages, as Gregory of Nazianzus saw: 'coastal cities support such shortages (of corn) without much difficulty, as they can dispose of their own products and receive supplies by sea; for us inland our surpluses are unprofitable and our scarcities irremediable, as we have no means of disposing of what we have or of importing what we lack' (*Orationes* XLIII, 34–5, trans. A. H. M. Jones). Thus even if, as Hopkins has argued, very few cities outgrew 'the supportive capacity of their immediate hinterland' (whatever that might have been), at least to the same degree as Rome, Alexandria, Antioch or Carthage (1983: 105), those with access to the sea had the possibility of remedying crop failures. These would not have been infrequent for, as Halstead has pointed out, even in some areas of modern Greece two out of seventeen years are disastrous for grain (1981: 189–90).

Since, by their nature, written sources tend to be particularistic, it is important to examine other ways of testing the generalisations based upon them. Material assemblages offer a promising area of investigation since they are common to all sites of classical antiquity. As only durable artefacts generally survive, the problem is one of understanding the processes which led to the formation of the archaeological record in question and then the relationships between the present and the original, parent cultural assemblage. Although the perishable nature of grain does not appear to make it a promising subject of archaeological researeh, the purpose of this paper is to identify such traits in the archaeological record which can provide us with a yardstick of the relative dependence of maritime cities on sea-borne traffic, of which the carriage of foodstuffs formed perhaps the largest element. While primarily concerned with the Roman period,

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the model can be extended backwards to the Archaic and Classical Greek periods and forward into the Middle Ages. First it is necessary to review recent advances in our knowledge about certain items of trade.

II

Research on Roman pottery, for example, has seen an enormous advance in our knowledge of the origin and distribution of individual wares in the Mediterranean region. At the same time the development of quantitative methods is beginning to allow us to make comparisons between sites, as well as within them. Estimates of the different proportions of the vessels present, whether amphorae, cooking or table wares, and of the different wares according to source have been obtained. Investigation of amphorae has provided insights into the movement of certain liquids such as wine and olive oil as well as other perishables which were packaged in this way (Patterson 1982; Peacock and Williams 1986). No clearer evidence of the traffic in foodstuffs in which *all* Mediterranean cities of the Roman period participated may be adduced. The extent to which the commodities carried in amphorae may be regarded as a luxury rather than a staple is open to debate (cf. Purcell 1985). Nevertheless as assemblages of these vessels are studied from individual sites it is possible to formulate hypotheses about the changing relative importance of the producing regions concerned. The survival of the pottery amphora must, however, bias our view of the carriage of foodstuffs against those producers who favoured packaging in barrels, skins or sacks. In this respect it is interesting to note the evidence of barrels from Roman London. All dated examples belong to the first and second centuries, exactly when imports of amphorae were at their greatest (Wilmott 1982).

Interpretations of the patterns of distribution and changing sources of supply and what gave rise to them are necessarily more speculative. The material evidence alone does not help us to discriminate between privately inspired enterprise and the imperially-assisted scheme. The exchange between the different estates of individual landowners or of corporate organisations like the Church cannot be distinguished on the basis of the artefacts alone (cf. Whittaker, 1983). Once characterised, the latter allow us to register their quantities, identify sources and sometimes their contents, and chart the changing flows from the suppliers. Regarding the question whether the contents of amphorae satisfied luxury or basic needs, further insights will be gained when more data are available to allow us to study quantities and distributions within cities.

Alongside the study of amphorae, the investigation of table and cooking wares had advanced with equal rapidity. Characterisation and distribution studies have cast remarkable light on the movement of these manufactured goods which, even at their best, were of low value (cf. Vickers 1985; Fulford 1986). In themselves these wares with their often Mediterranean-wide distributions appear to offer an eloquent testimony to the scale and sophistication of inter- and intra-provincial traffic, upon which documentary sources shed little light, and they therefore make a fascinating study in their own right. However the mechanisms by which these comparatively humble goods reached their various destinations remains to be more fully explored since these have important

implications for the nature of maritime (and overland) traffic in general. It is clear that what survives in the archaeological record does not represent the totality of what was traded or redistributed.

So, building on this premise, Hodder has used Romano-British pottery to explore marketing patterns (Hodder 1974a). In the case of the small town of Cunetio (Mildenhall) in southern England the distributional area of a type of domestic pottery made close by the town was used to infer the market catchment area of that town (Hodder 1974b). The particular shape of the distribution pattern was also used to infer the social constraints affecting the distribution (Hodder 1979: 193–4). This writer has used analogous archaeological material from the medieval period, where documentary evidence of traded goods also survives, to illuminate the perishable and thus archaeologically invisible content of traffic between Britain and the continent in the later Roman period (Fulford 1978). The idea that pottery can be regarded as a proxy for a much greater volume of traffic that is either archaeologically invisible, or only partially evident in documentary sources has been used implicitly to develop a hypothesis for the long distance supply of the Rhine frontier (Middleton 1979). A similar case has been made for the dependence of the British garrison on both external and non-local supplies within the province (Fulford 1984a).

Studies of the composition of large ceramic assemblages from Carthage have led to discussion of the significance of the changing proportions of imports to local wares within that assemblage (Fulford 1980; 1983; Fulford and Peacock 1984: 255–62). In the period between *c.* AD 400 and *c.* AD 650, imports at Carthage peak in the later Vandal, rather than Byzantine period. This initially provoked the thought that the Vandal occupation had not been as damaging to the African rural economy as had been thought by others. When, however, the later Roman-Byzantine period is set against the perspective of the later Punic/Republican and imperial periods an alternative explanation presented itself. Before the Vandal occupation the documentary sources celebrate Africa's fecundity and this, in the ceramic record, corresponds with a long period with relatively few imports, whether amphorae or other forms of pottery. The increasing proportions of imported amphorae and other pottery through the Vandal period can now be regarded as evidence of a greater reliance on the part of Carthage on supplies brought from outside Africa (Panella 1983). Analysis of the amphora and coarse pottery record from Roman Berenice in Cyrenaica also suggested a considerable reliance on external supplies (Riley n.d.; Fulford 1984b). Such dependence does not preclude the capacity for Cyrenaica to export some grain in good years, as the documentary sources suggest did happen (*Digest* 19, 2, 61). The argument for Berenice was also supported by complementary evidence from the faunal and plant record (Barker n.d.).

In the course of the development of these models to interpret the changing character of ceramic assemblages, corroborative evidence has emerged from the Mediterranean itself. Both cursory and detailed surveys of ancient wrecks consistently show that table and domestic ware pottery formed a minor component of ships' cargoes. Parker has tabulated the evidence recorded so far and has shown that pottery (apart from amphorae) never accounts for more than about 20 per cent of the *recovered* cargo, even when amphorae were in a minority (Parker 1984: Fig. 7). Although examples may well appear of ships whose cargoes appear to have been devoted more or less entirely to other

pottery — and some have been claimed, in advance of full publication of the wreck concerned (cf. Pucci 1983: 111) — such wrecks will form a minority. As Parker has pointed out, wreck evidence has to be interpreted with care for certain kinds of bulk cargo will be less visible than others (Parker 1984: 102). Amphorae are comparatively easy to detect on the sea-bed, but what archaeological residues might we expect to discover of a ship whose main cargo had been grain? Recognition of just the subsidiary cargoes, among which pottery would bulk large, could lead to a completely erroneous interpretation of the original cargo. So far no ships carrying grain or timber cargoes have been recognised; the identification of a 'pottery' ship raises the suspicion that the archaeology has been misunderstood.

The wreck evidence does support the premise that pottery was traded alongside other goods, but neither it nor the pottery assemblages themselves can yet illuminate the possible volume of traffic involved, not least because not all cargoes would necessarily have contained pottery. Pottery may not account for more than about 20 per cent of the recovered cargoes in Parker's (1984) tabulation, but how many cargoes to a coastal city like Carthage or Berenice are required to raise the average ratio of imports to local wares by as much as one per cent? If we must remain uncertain about absolute quantities until such time as a scheme of calibrating the archaeological data is devised, ratios such as that of imported to local wares do provide a basis for making comparisons between and within sites through time. This in itself is an important addition to the fragmentary and diverse character of the documentary sources and assumes only that the use and discard of pottery were fairly uniform across the length and breadth of the Mediterranean.

To form a basis for comparative study it is essential to have a consistent scheme of quantification so that the proportions of individual classes of pottery such as amphorae, table and domestic wares amongst the total ceramic assemblage can be calculated. Attributes such as rims, bases and handles lend themselves to this purpose. The potential remains for widening the scope to include for example, lamps, terracottas and bricks where numbers or fragments or weights can be used. The identification of imported as opposed to local wares depends on the accurate characterisation of individual wares and their matching with material of known source. In this respect our knowledge of amphorae and table wares is considerably more advanced than for cooking wares whose often wide distribution is only beginning to be appreciated (e.g. Hayes 1972: 455, map 5; Riley 1981; n.d.; Fulford and Peacock 1984). Comparison of the proportions of different wares will be affected by the presence of residual pottery, sherds whose age is considerably older than those which are regarded as more or less contemporary with the date of deposition and whose presence is often due to the disturbance of earlier levels. Since problems of definition make it virtually impossible to exclude all residual material, its presence has to be accepted as a factor influencing the ratios of wares under study. An essential prerequisite of this approach to the pottery is that the assemblages under consideration derive from securely stratified deposits. The alternative is to examine the ratio of different types of pottery whose date range is already known, irrespective of its archaeological context. Kenrick (1985b) has pursued this in a study of the Hellenistic and Roman fine wares from Berenice. Although residual material is excluded by this method, a long timespan — often in excess of a century — is required to encompass the broadly contemporary production period of all the wares being compared. With many types of

amphorae and most coarse wares a combination of ignorance of date ranges and a lack of significant typological change means that they can only be encompassed by even longer periods, Hellenistic, early or late Roman, etc. Given the requirement for secure stratigraphy and the volume of ceramics from Mediterranean sites, it is not surprising that only a handful of sites around the Mediterranean can be used as a basis for comparison.

This paper is particularly concerned with investigating variation in the ratio of those wares that can be shown to have been imported from outside the region or province of the city concerned to those that are believed to originate from the same province or region. While this overlooks the often distant sources of pottery supplied to a city from within its own province, the main objective is to examine the dependence of urban communities on sea-borne traffic, as opposed to their hinterland which is construed here as, broadly, the province. This represents a development of an earlier paper which examined the representation of amphorae, irrespective of source, and showed that in the early empire there was comparatively little variation in the proportion of this class of vessel in the ceramic assemblage, representing, as it does, the supply of certain foodstuffs, at the sites concerned (Fulford forthcoming). This suggested a fairly even access to and dependence upon commodities carried in this way. Correspondingly, more variation in the proportion of amphorae in the late Roman and Byzantine period indicated greater differences in access to and dependence upon imports. This contribution is also based mainly on the material from Ostia, Berenice and Carthage (Figure 1) and is concerned with the first to the fourth centuries AD. It is based on only

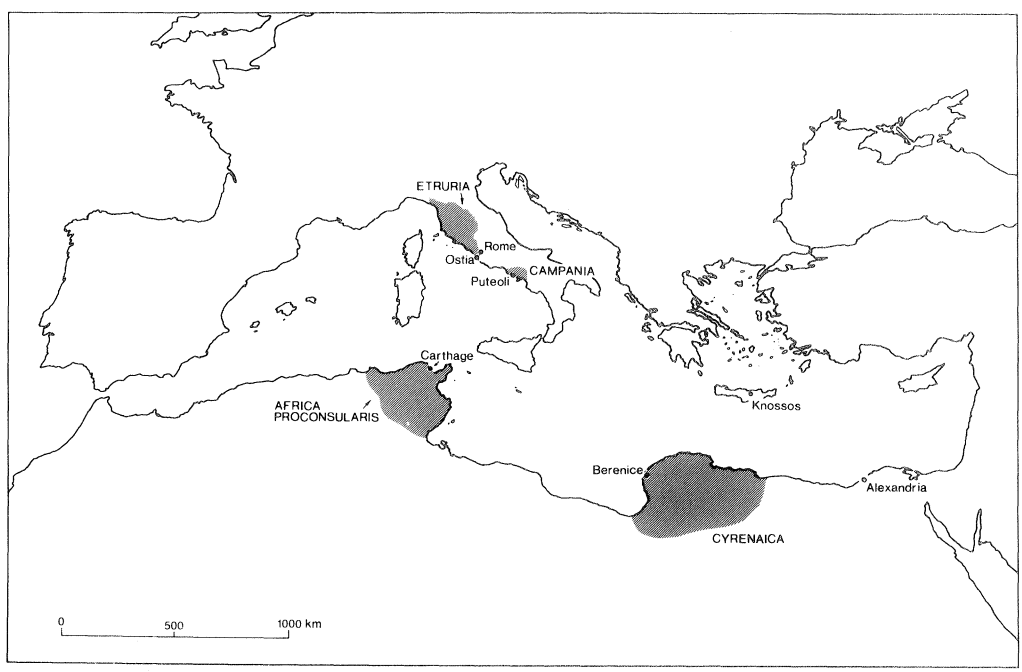

Figure 1 The Roman Mediterranean: sites mentioned in the text.

those assemblages from which estimates of the numbers of rims, bases and handles per vessel type can be computed. There is insufficient evidence to base the comparisons on weight statistics.

Although all the pottery from the recent stratigraphic excavations at Ostia is listed meticulously only the amphorae and some of the fine wares are treated with systematic source-consciousness (*Ostia* 1–4, 1968–1977). In the case of the domestic wares it is now possible to assign whole typological classes to source and, for the purpose of the present estimate vessels 'a orlo annerito' and 'a patina cenegnorola' have been given an African (Tunisian) attribution. Such identifications have since been adopted in *Ostia* 4 (1977). Thus the calculations based on counts of rims, bases and handles (from *Ostia* 3 (1973)) that have been made for the imported coarse wares are likely to under-represent the true figures. In the case of Berenice the information from two separate reports (Riley n.d.; Kenrick 1985a) has been combined, but the quality of the data is such as to make possible an accurate estimate of the ratio of imported to local wares. For Carthage, where there are few quantified early Roman deposits, it has also been possible to make an approximate estimate of imported to local on the basis of certain identifications (Hayes 1976). Figures that are quoted in the ensuing discussion can be relied on with varying confidence according to the structure of the original reports from which they are derived (Figure 2).

At Berenice the proportion of imported amphorae, table and cooking wares in three assemblages, each of which represents an amalgamation of different deposits, dated to the early-mid first century AD (N = 875), the second half of the first century AD (N = 2592) and the first half of the second century (N = 2436) ranges over, respectively, 42, 37 and 42 per cent. At Ostia the proportion of non-Italian imports in amalgamated groups of the later first (N = 2847) and first half of the second century AD (N = 1765, 1058) amounts to about 20 per cent, of which African cooking wares contribute the largest share (approximately 10 per cent of the whole assemblage). Much of the pottery of this date is of Etruscan (Arretine) and Campanian origin, representing considerable long-distance traffic within Italy itself. In a deposit of early-mid first century date at Carthage (N = 564) the total non-African (Tunisian) element appears to be no more than about 20 per cent (Hayes 1976). At Knossos the non-Cretan pottery in an assemblage of later second century date (N = 7855) is estimated by Hayes at about 25 per cent (Hayes 1983: 161).

Although early (N = 4064) and mid-third century (N = 3387) groups from Berenice see a reduction in the proportion of imports to 25 per cent and 29 per cent, the non-Italian element at Ostia rises sharply so that in groups of the early third and to the late fourth century it accounts for over 85 per cent (N = 4887; 667). African pottery, including sigillata, cooking wares and amphorae account for most of these imports so that it is no exaggeration to state that *at least* three-quarters (and perhaps as much as 80–90 per cent) of the later Roman pottery assemblage at Ostia is of African (= Tunisian) origin. In contrast, less than 10 per cent of the imports in the contemporary groups at Berenice are of a similar origin and this proportion is made up principally of sigillata with some amphorae. At Ostia both the proportion of non-Italian wares and of African pottery especially are particularly striking. Leaving aside the question of the volume of accompanying cargoes, a contributory factor to the abundance of African

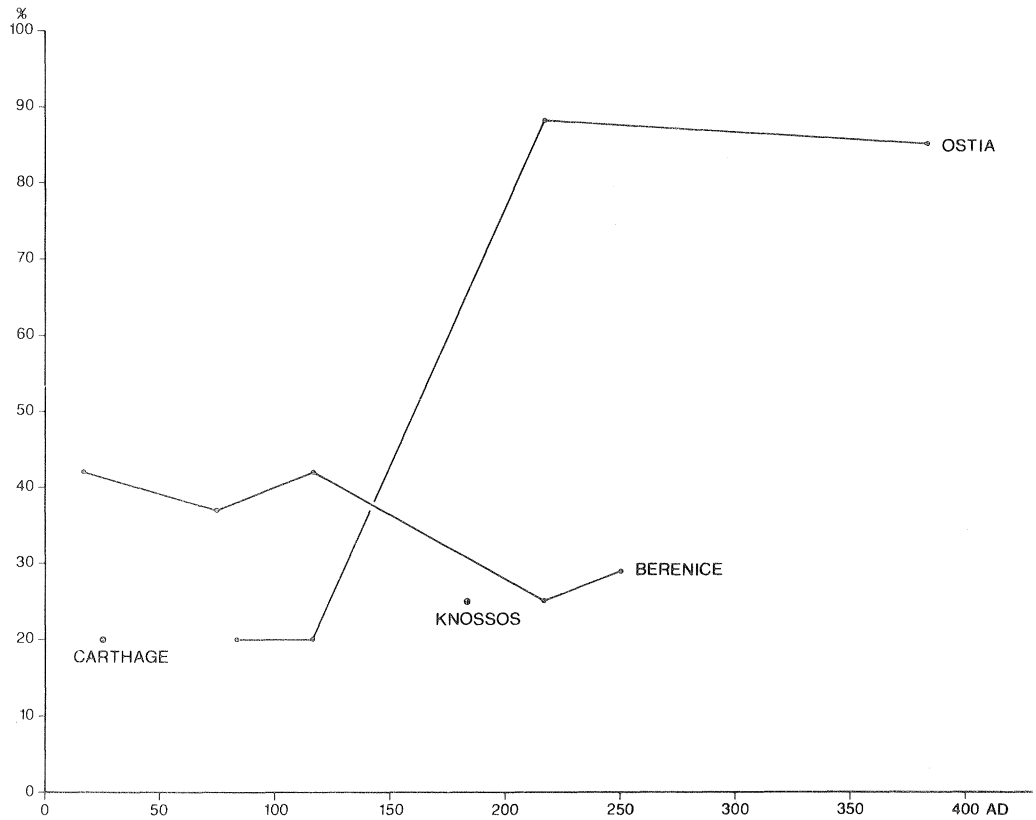

Figure 2 Graph showing the percentages of imported pottery at Berenice, Carthage, Knossos and Ostia between the first and fourth centuries AD.

pottery may be the relatively short and direct sea passage between Ostia and the ports of Africa Proconsularis.

Although we do not yet have a satisfactory sample of quantified pottery assemblages upon which to base firm conclusions, what we do have does deserve some comment. It may be observed, for example, that none of the figures cited for 'non-homeland' pottery is less than about 20 per cent and that only the later Roman groups from Ostia consistently exceed 40 per cent. There is considerable variation between about 20 and 40 per cent, which, as has been observed elsewhere, relates more to the fluctuations in the sigillata and cooking ware populations than the amphorae. While in some cases the high proportion of imports may relate to the status of the area excavated (cf. Allan 1984: 101–2 for the social distribution of post-medieval ceramics in Exeter), we have too few sites in any city from which to ascertain the mean for the city as a whole. The fact that all the assemblages which have been examined reveal high ratios of imports is, surely, more than coincidence, and cannot be simply explained away as the result of digging only in the wealthy areas of the cities.

Compared with Britain (Figure 3) even the low figures appear relatively high. Imported pottery is relatively common in first century urban contexts in southern

Britain, but only in assemblages from London appears commonly to exceed 20–25 per cent in this period (Milne 1985: 40–1, 121; P. A. Tyers pers. comm.). High figures are recorded from some pre-Flavian military sites. At Kingsholm the proportion of imports from all contexts amounts to 50 per cent of the assemblage (by sherd count) (Hurst 1985: 92), whereas at Usk in South Wales the proportion of imports (excluding samian) based on a rim count is about nine per cent in phase I and 13 per cent in phase II (K. Greene pers. comm.). If we allow about 10 per cent for samian the ratio of imports approximates to between one fifth and one quarter of the assemblage. In London the mean value *by weight* for amphorae in the first century is 35 per cent (Milne 1985: 41), comparable to Mediterranean figures (cf. Fulford and Peacock 1984: Appendix 3; Riley n.d.: 109). For samian alone from first century contexts in London the proportion ranges from 10 to 25

Figure 3 Roman Britain: sites mentioned in the text.

per cent of all vessels found (Milne 1985: 121). In the second century figures in excess of ten per cent are exceptional; assemblages at Lincoln (Darling 1984: 90), or Silchester serving as examples (Fulford 1984c: 123–4). By the third and fourth centuries imports altogether are rare. Even at southern ports the proportion of imported to British wares is not thought to exceed 10 per cent (Fulford 1978: 64) and even that figure may now be regarded as too high.

III

What might we hope to deduce from this information about the ratio of imported to local wares? First, given the relatively humble status of both table and cooking ware pottery, the fact that imports at coastal sites in the Mediterranean regularly account for at least one fifth of the assemblage suggests a considerable volume of maritime traffic. The problem is the lack of any obvious control against which this information can be measured so that x per cent of a particular type of import such as pottery in an archaeological assemblage can be correlated with x tonnes of merchandise. Although it may not be appropriate to compare north-western Europe with the Mediterranean it is relevant to recall that the volume of imports from Roman Mediterranean sites is generally greater than that recorded from British medieval ports (13th–15th centuries) where we have some insight into the volume and character of maritime traffic as a whole (Allan 1983a: 193–6).

One possible approach towards an evaluation of the Mediterranean evidence is to set it against what is known of Rome's corn supply; for this is the best documented aspect of Roman marine traffic, although there are serious problems with the interpretation of some of the sources (Pavis d'Escurac 1976; Rickman 1980; Garnsey 1983). From Republican times Rome had come to rely on imported corn from outside mainland Italy. By the first century BC, for example, Sicily, Sardinia and Africa were regarded as important supplementary sources of grain and, for the first century AD, there are figures for the contribution of overseas suppliers. Unfortunately these figures are not above suspicion. Josephus, writing in the late 70s, reports in a speech attributed to King Agrippa II and delivered in AD 66 that grain exports from North Africa (excluding Egypt) fed Rome for eight months of the year (*Bell. Iud.* II 383) and, later on in the same speech, that Egyptian corn fed the capital for four months alone (*Bell. Iud.* II 386). In the fourth century epitome (*de Caes.* I, 6) a figure of 20 million *modii* is given for the amount of grain tribute from Egypt for Rome in the time of Augustus. As Garnsey and others have pointed out, a combination of the two sources give an unacceptable figure of 60 million *modii* (400,000 tonnes) for the volume of grain imports to Rome in the first century AD (Garnsey 1983: 118–19). Besides the actual figures which are disputed, the texts imply that Rome was totally dependent on external supplies — Africa and Egypt — by the third quarter of the first century AD. It is curious that such a transformation from the situation in the first century BC, when Sicily and Sardinia as well as Africa *supplemented* Italian corn, has received no comment. We may well wonder what might have happened to Rome's traditional supplies. The fact that Claudius had to initiate harbour works at Ostia which were not satisfactory until the completion of Trajan's

harbour (Meiggs 1973) surely fuels the suspicion that our ancient sources are misleading us about the origins of Rome's grain in the first century AD. It would have been rash to entrust Rome's lifeline to overseas grain when the reception facilities were inadequate to receive sea-going vessels. One interpretation of Josephus and the Epitome might be that the figures refer to the approximate amount of grain available from Africa and Egypt to the Roman state to dispose of as it wished; alternatively they may refer only to the annonal wheat. At most the amount was equivalent to twelve months supply to the capital. Such surplus could have been sold on the open market, used for the relief of famine (Wörrle 1971), or as support for imperially-sponsored building projects in coastal cities or, as Rathbone has suggested, diverted to fulfil military needs (1983: 55 n. 24). Middleton's (1979) arguments about army supply and the routes across Gaul to the Rhine frontier are better understood if there was an input up the Rhône from the Mediterranean. The wreck evidence certainly points to a high volume of traffic between Italy and Gaul in the late republican and early imperial period (Parker 1980: 50–1). Even with the halved figure of about 200,000 tonnes suggested by Garnsey (1983: 118) this represents about 500 shipments of 400 tonnes each (Hopkins 1983: 101). Given, as we now know, that shipments were not devoted to one type of cargo, the actual number of sailings would almost certainly have been greater. Even the projected volume of traffic in grain alone is scarcely conceivable before the completion of Trajan's harbour at Ostia, let alone Claudius's, omitting, as it does, consideration of small coastal traffic from Puteoli or of the river boats which took supplies up the Tiber and the actual volume of *all* maritime traffic.

The problems presented by a supposed total reliance on overseas supplies, even accepting the lower total figure proposed by Garnsey, might lead us to question whether in fact, contrary to what commentators have agreed in the past, Africa was the single most important source of Rome's grain (rather than the single most important non-Italian source) from the first century AD (cf. Rickman 1980: 231–5; Pavis d'Escurac 1976: 179–80). If we are to question the accuracy of the historical sources in this way we are left, unfortunately, with no alternative written testimony with which to reassess the problem. By rejecting an interpretation whereby Rome moved rapidly to a position of total dependence on overseas sources of grain in the first century AD we automatically allow the reinstatement of traditional sources such as Sicily and Sardinia or Campania within Italy itself. Evaluating the changing relative contributions of these regions and the impact of new supplies on the old is beyond the scope of the surviving documentary evidence. We may suspect that the contribution of overseas sources has been exaggerated in the minds of contemporary witnesses simply because the exigencies of the sailing season meant that the first grain ships always began to arrive at the lean time of year between sowing and harvesting when grain stocks were inevitably low and the population anxious (cf. Seneca, *Ep.* 77).

The importance of African corn continued to grow. At the end of the second century AD the emperor Commodus organised a special fleet to ensure delivery of African grain at a time when the Egyptian contribution could no longer be relied upon (S.H.A. *Commodus* 17.7). By AD 330, when Egyptian corn fed Constantinople, reliance on African corn seems to have been about total, at least among the non-Italian sources. The importance of Africa is also reflected in the number of officials recorded in inscriptions

from Africa as being concerned with the organisation and delivery of the *annona* (Tengström 1974).

At first sight it seemed as if the evidence offered by Roman written sources into the origins of Rome's corn might allow the possibility of it being developed as a control to further evaluate the archaeological evidence for maritime traffic set out in the second part of this paper. Unfortunately, the internal difficulties presented by those written sources means that, at best, we may look for further insights by setting the written and archaeological sources alongside each other for comparison. In developing the ceramic paradigm we are making two important assumptions: first that ceramics imported by sea represent a fraction of the total cargoes concerned; second that the volume of pottery, recorded as a proportion of the total assemblage, roughly correlates with the total volume of goods imported.

In the case of Ostia and, by extension, Rome, the written evidence confirms reliance on non-Italian sources of grain although the extent of that dependence is in question. Although the residual pottery may have a depressing effect on the estimate of non-Italian imports in the later first — mid second century assemblages, it is remarkable that the proportion is not markedly different from the figures obtained from Berenice and Carthage. If anything the proportion of non-Cyrenaican imports at Berenice is considerably higher than at Ostia in the early Roman period. By the third and fourth century such changes had taken place in the composition of the Ostia assemblages that they can be regarded as exceptional with the proportion of imports at least as twice as great as so far recorded elsewhere.

Given the reservations expressed above about the extent of Rome's dependence on non-Italian cereals in the first century AD the ceramic evidence is not altogether unacceptable as a proxy of the actual reliance on imports. Indeed the sharp rise in the volume of imported ceramics between the early second and early third century correlates well with the growth in the provision of storage facilities at Ostia (Rickman 1971; Vitelli 1980). The actual figure for non-Italian imports is, for the reasons described above, likely to have been higher for the later first and second centuries. The ceramic evidence for the later imperial period fits well with the written evidence pointing to a much greater reliance on imported grain in general, but largely derived from Africa in particular. The ceramic evidence suggests a more gradual increase in the degree of dependence on non-Italian grain and this overcomes both the problem of what might have happened to Italian cereals in a period of rapid change and the lack of secure harbour facilities until the second century. Such an interpretation does not represent a rejection of the early imperial written sources, but serves to emphasise the political importance that was attached to securing a guaranteed supply of grain to offset the Italian short-fall. The evidence suggests that in fact more grain was ear-marked than was normally needed with the consequence that surplus was available to the imperial government to be sold or used as it thought best.

The case of the supply to Ostia and Rome in the early imperial period is an important test of the basic assumption that the ratio of imported to local pottery roughly correlates with the volume of traffic, but it overlooks the potential effect caused by the proximity of the consumer to the nearest major source(s) of pottery. In the later Republic and first century AD Italy was a major source of wine carried in amphorae (Dressel 1 form, giving

way to Dressel 2–4), table ware (black-glazed Campana A ware, giving way to red-slipped sigillata) and also of cooking pottery such as the Campanian wares. In the first century AD the domination of Italian pottery producers may have been such as to exclude imports and thus distort the real extent of maritime traffic. Carthage is also an example of a city with a comparatively low ratio of imported to African (Tunisian) wares throughout the imperial period. Like Italy, Africa (Tunisia) was a major producer of pottery of all kinds, including amphorae to carry olive oil. Additionally, and perhaps because of its strategic importance to Rome, the documentary sources make it clear that Africa was a major source of cereals. It is unlikely therefore that a city like Carthage would have had to look beyond Africa Proconsularis to satisfy its basic subsistence needs. By the early fifth century we find (above, p. 60) the imports at Carthage beginning to increase to reach a peak in the first half of the sixth century. Complementary documentary evidence hints at a corresponding decline in African agriculture. Although it may be unwise to generalise, given the present state of our knowledge of regional agricultural regimes, there does seem to be a correlation between agriculturally prosperous regions and the production of pottery which served a wide market (cf. Carandini 1970). Within the major agricultural regions as a whole, pottery production may have been located in less fertile areas. Given that the demand for surplus foodstuffs was broad-based, the best way of ensuring a widespread distribution of manufactured goods, such as pottery, was to ship them alongside foodstuffs. It is then perhaps not surprising to find the major potteries within traditionally fertile regions with access (by sea) to wide markets. In the case of Italy the most important sources of pottery, Etruria (Arretine, wine amphorae), Campania (black-glazed ware, cooking wares and wine amphorae) correspond with the most important agricultural regions, renowned for the quality and yields of their cereals (Rickman 1980: 101–4; White 1970: 65–76). Indeed, Campania's importance to Rome as 'cellarium regnanti Romae' (*Expositio totius mundi et gentium*, 54) continued to attract attention in the fourth century. This kind of correlative evidence reinforces the idea that the contribution of Italian agriculture to Rome's food supply has been underestimated. If we extend the model to the Mediterranean as a whole we could use the ratio of imported to local pottery as a guide to the relative agricultural importance of different regions bordering on the Mediterranean. Cities with consistently low ratios of imports to locally made wares would be those in relatively more fertile regions than those with high ratios of imports. On this model, therefore, Cyrenaica (through Berenice) ranks as considerably less fertile than Africa Proconsularis (through Carthage). By the later empire and largely because of its great population Rome (through Ostia) appears, as the written evidence implies, very largely dependent on overseas supplies. It follows then that the original assumption that the proportion of imported to local wares relates to the overall volume of traffic need not be so, simply because the volume of traffic *from* regions with low ratio of imports, such as Africa Proconsularis, must have been as great as — if not greater than — the volume of traffic to more 'dependent' cities with high ratios of imports.

If we accept a greater contribution from Italian agriculture than the documentary sources would lead us to believe, the lack of eastern material as evidence of the supply of Egyptian grain is not so puzzling. That grain from Alexandria did reach Italy via Puteoli in the first century AD is attested by a number of sources such as Seneca (*Ep.* 77) and St

Paul (*Acts of the Apostles*, 27) as well as epigraphic evidence from Pompeii (Casson 1980: 26–28). If the amount reached the figure cited in the fourth century epitome of twenty million *modii*, it is curious that so little proxy evidence has survived. The route to Italy took the grain ships northwards to Cyprus, the southern coast of Asia Minor and only then westwards via Crete and Sicily to the west coast of Italy. Unless the luxury trade from the east also exploited the increase in the movement of grain with silks, spices, glass, etc. carried in place of pottery, it does seem remarkable that so little material evidence survives of it, not just from Egypt, but from the east Mediterranean as a whole. Although both amphorae and table wares, notably Eastern sigillata A, are present at Ostia, the quantities are negligible. While it is true that we do not yet have any relevant information from Puteoli which is known to have been a major port of entry for Egyptian grain, the record from Ostia would seem to suggest that we have an exaggerated record from the written sources of the volume of eastern grain that regularly reached Rome in the early imperial period. This would overcome the difficulty that Casson had detected 'that the conversion of Egypt into a Roman province brought in its wake a tremendous economic dislocation in both the west and the east. It would mean the loss to the former of its chief source of supply . . . then . . . there should conversely be a sudden glut of grain in the west. Yet clearly this did not happen' (1954: 183). Neither Casson's explanation on the basis of circumstantial evidence that the origin of the supply of Egyptian corn to Rome lay in the republican period — the gradualist view — nor Rathbone's argument (1983: 52–3) that Egyptian corn was surplus to requirements in the eastern Mediterranean in general are wholly convincing. One further possibility remains to be explored and that is that the pottery industry in Italy exploited the traffic bringing grain for Rome and that pottery travelled out from Italy in the holds of the grain ships on their return voyages. It is certainly true that Italian sigillata, amphorae and other wares have a wide distribution in both halves of the Mediterranean, but we do not yet have enough information to compare west with east as far as the ratio of Italian wares to the rest is concerned both in the republican and early imperial period. In particular we do not yet have any useful information from Alexandria itself. It should also be recalled that African sigillata shows a comparably wide distribution in the third and fourth centuries (Hayes 1972) at a time when it is accepted that Egyptian grain was no longer of importance to Rome and that shipments no longer reached Italy. With the *a priori* argument that the historical evidence paints an unconvincing case for total dependence on overseas supplies and the insights offered by the archaeological evidence, it may be argued that while Rome undoubtedly drew regularly on Egypt for some of its requirement, the greater part was surplus to the capital's requirements but available to be used in other ways.

While it has been argued that the gross ratio of imported to local pottery yields insight into the maritime traffic in foodstuffs, it should not be assumed that there is a direct correlation between the source of pottery and imported foods at any one site. Redistribution of merchandise and the cabotage character of Mediterranean trading makes it virtually impossible to reconstruct in detail the pattern of ancient commerce from archaeological evidence alone (cf. Allan's work on the redistribution of post-medieval ceramics (1983b)). We should not, for example, deduce from the extensive distribution of Italian sigillata in the first century AD or of African sigillata and cooking wares in the third and fourth centuries that there was a comparable distribution of Italian

or African foodstuffs in particular. It is however reasonable to assume that these wide distributions originated from traffic in foodstuffs and perishables in general.

The correlation between African grain and oil at Rome and the presence of African pottery is exceptional and probably has much to do with the proximity of Africa and Italy and the relative directness of the sea-route with few potential ports of call. Certainly Africa (Tunisia) represents the single and most important source of non-Italian pottery in the later first and early second century assemblages at Ostia. As for the ships returning to Africa it is worth pointing out that the largest collection of Italian brick stamps of first and second century date outside of Italy is to be found at Carthage (Hartley 1973: Fig. 1). As the analysis of unstamped bricks from later contexts at Carthage has indicated, the evidence of stamps may not be representative of the scale of imports as a whole (Fulford and Peacock 1984: 242–6). The role of Africa as the prime source of non-Italian grain (and oil) for the imperial capital is amply supported by the archaeological evidence. The importance of that role increased with time as both the material and documentary evidence reveal. By the fourth century there was a special official, the *praefectus annonae Africae* who was responsible for the gathering of supplies and their despatch to Rome as well as detailed rules for the delivery of grain to municipal granaries and the *horrea fiscalis* (Tengström 1974).

The difficulties in interpreting archaeological and written sources are such as to make it virtually impossible to use the Ostia evidence as a control for understanding maritime traffic evidenced at other Roman coastal cities. However, the composition of the third and fourth century assemblages at Ostia is exceptional both in terms of the proportion of imports and of the proportion from one region. This does correlate with written evidence for a greater reliance on African corn in the later Roman period.

The only other approach available to us at present is to exploit such quantified ceramic evidence as there is from medieval and post-medieval ports in Britain, where written evidence survives to set alongside the archaeological data. Although we must allow for the fact that the pottery amphora was seldom employed as a container and so must confine our comparison to those studies based on fine and cooking wares, the ratio of foreign to British wares in the period of the thirteenth to the eighteenth century is compatible with the imported:local ratio from the Roman Mediterranean (Allan 1983: 193–6; Allan 1984: 101–5). Even on the basis of this comparison, the later Roman evidence from Ostia, with imports in excess of 80–90 per cent, remains exceptional. From the Mediterranean itself valuable written evidence such as that contained in the Geniza records from Cairo of mid-tenth to mid-thirteenth century date awaits complementary archaeological evidence. It is difficult, for example, to assess the significance of the rarity of references to traded pottery, particularly at a time when skins, rather than amphorae, served as containers for oil and wine (Goitein 1967: 110–11, 334).

The analysis of British medieval and post-medieval assemblages alerts us to the need both to study variation between sites within any city and to acquire a great deal more data from the Mediterranean before we have a reliable set of mean figures from each city through time. The written evidence from medieval Britain also reminds us that basic foodstuffs, rather than luxuries like wine, formed a minor element in the composition of trade as a whole which was largely devoted to traffic in raw materials, especially wool, in

exchange for finished goods such as cloth (cf. Bolton 1980: 287–319). Pottery, incidentally, even in the post-medieval period when the overall quantity traded was large, still formed only a small part of composite cargoes (Allan 1983b).

Although it has been assumed that a general trade in basic foodstuffs was more important than luxuries, manufactured goods and raw materials in the Roman Mediterranean, there is no irrefutable evidence that this was so. Indeed the Geniza documents from Cairo only once refer to a wholesale merchant in wheat, but this may be more of a reflection of trade specialisation by different sections of the medieval community (Goitein 1967: 211). Nevertheless, in the light of the north European medieval and post-medieval evidence the ratio and diversity of imported to local wares both reinforces the fact of interdependency among coastal cities and gives an insight into its absolute importance. Unlike their land-locked counterparts, coastal cities could — and did — outgrow the supportive (agricultural) capacity of their immediate hinterlands. While the material evidence alone cannot comment on the importance of grain as an item of trade in the Roman Mediterranean, it certainly confirms the volume and distribution of traffic in general and we may presume, taking our lead from the written sources, that trade in staples formed a major component of it.

The meticulous analysis and quantification of archaeological assemblages has barely been started in the Mediterranean and it is urgent that this continues alongside careful stratigraphic excavation so that the hypotheses put forward here can be tested further. Such data will not only enable comparison to be made within the Mediterranean but across the empire as a whole, thus providing us with a valuable general insight into the processes of urban formation and decay.

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Abstract

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Economic interdependence among urban communities of the Roman Mediterranean

Classical sources hint at the role of trade in the development and maintenance of urban communities with access to the sea. With very little surviving written evidence, the usefulness of the changing ratio of 'imported' to 'local' wares in ceramic assemblages is assessed as a means of gauging the economic interdependence of Roman coastal cities of the Mediterranean. The currently available data are assessed and tested against a number of independent sources; in particular the changing patterns of importation to Ostia is set against the historical evidence of Rome's corn supply. The potential for understanding the processes which produced the assemblages under consideration by reference to similar material from better documented pre-industrial societies is also explored. It is concluded that there was a very high level of interdependence among Roman cities around the Mediterranean.