



# A DROP IN THE OCEAN - MALTA'S TRADE IN OLIVE OIL DURING THE ROMAN PERIOD

Timmy Gambin

*Department of Classics and Archaeology, University of Malta*  
*timmy.gambin@um.edu.mt*

## ABSTRACT

For the most part, the study of trade in the Roman period focuses on the production and movement of large quantities of commodities and luxuries from one part of the Roman Empire to another. The first part of this paper will focus on the main Roman centres of production and consumption and how these shifted over time due to the evolving geo-political and economic landscapes of the time.

At the centre of the movement of these goods was the sea. Ships transported thousands of amphorae filled with oil, wine and *garum* across the Mediterranean and beyond. Islands strategically placed at the crossroads of this exchange found themselves in an ideal position to exploit maritime trade.

Through this paper I intend showing, using Malta as an example, how other less obvious currents of production and exchange existed alongside mainstream trade. By taking advantage of dispersed hinterlands Malta was, despite its small size, able to export its own olive oil – this despite its proximity to huge centres of production in North Africa.

## INTRODUCTION

This chapter covers a chronological period spread across four centuries from 200 BC

to 200 AD. This segment of Roman history provides an excellent context within which we can frame the macro subject (ancient trade and trade in olive oil) as well as the micro (production and possible export of Maltese olive oil). A number of reasons justify the importance and choice of this time span. During this period Rome developed from an important city-state with a limited and localized terrestrial powerbase into an overseas power that expanded its influence to all corners of the Mediterranean and beyond. The economic implications of this expansion will be discussed in more detail below. For the Maltese Islands, this period represents a transitional phase which saw the slow and gradual disappearance of its Punic culture and the subsequent onset of Romanization.

In the third century BC Rome was essentially an Italian power. To the north of Rome the Etruscans had been subdued in the fourth century BC. Likewise, in the third century BC much of Magna Graecia was in Roman hands. Essentially it was the Second Punic War (218-201 BC) that marked the tipping point and the 'beginning of Rome's conquest of the entire Mediterranean, an ambition that was largely realized by 133 BC' (Morel 2007: 503). The initial expansion into Sicily, Sardinia and Spain was followed by the rapid conquest of North Africa, Macedonia and Greece in the second century BC. Besides having

vast productive capabilities and potential, these areas also needed to be garrisoned. Forts, outposts and armies on the move all needed to be supplied with foodstuffs and raw material (leather and metals for example). Whereas some supplies would have been acquired locally, the archaeological of the provinces clearly indicates an influx of products, especially foodstuffs, that originated in Italy (Morely 2007: 575).

In addition to external exigencies, this new found power also created pressures at home. The population of Rome grew rapidly from a population of circa 375,000 in 130 BC to one of close to a million by the time of Augustus' rule (Morris 2011: 264). This metropolis, together with other large urban centres including Alexandria and Carthage (after its recovery) with populations of over 500,000 and smaller cities (such as Antioch and Ephesus – circa 100,000 each) and numerous towns with urban populations of between 3000 and 30,000, would have provided significant centres of consumption – in other words, markets.

## ROMAN TRADE – AN OVERVIEW

This new geo-political landscape provided impetus for trade. In the context of ancient Rome the word trade is somewhat of an ambivalent term. By its very nature, the definition of trade implies buying and selling<sup>1</sup> – exchange and reciprocity. For the sake of clarity and uniformity the word trade will here encapsulate the generic movement of goods whether these were exchanged (for other goods or money) or were simply being delivered (as tax in kind for example).

In the second and first centuries BC, production centres on the Italian peninsula evolved into prime suppliers for the new territories overseas with agriculture

driving the Roman economy (Morel 2007: 506). The three main agricultural commodities to be transported by sea were cereals, olive oil and wine. Another foodstuff that was shipped in very large quantities was *garum*.

1. Cereals grown on the Italian mainland only partially satisfied Rome's demand. Shipments from Sicily initially and Africa and Egypt later, made up the (significant) difference (Rickman 1980: 231). Following severe droughts in 51 AD emperor Claudius 'took all possible steps to import corn, even in the winter months – insuring merchants against the loss of their ships in stormy weather (which guaranteed them a good return on their ventures), and offering a bounty for every new grain-transport built, proportionate to its tonnage.'<sup>2</sup>
2. Olive oil had more than one purpose in antiquity. Good oil was used for use in the preparation of food as well as for perfumes and bathing. Oil was also used in rituals and burnt in lamps (Brun 2003: 169-181). Initially, oil from Adriatic Italy packaged in Brindisi type amphorae made its way to the new territories (Bezeczky 2009) sometimes being shipped together with Italian wine. In the first century AD, Spain emerged as the main supplier of olive oil. Cargoes of Dressel 20 amphorae made



Figure 1



Figure 2

their way towards Rome and other parts of the Empire including Carthage (Rice 2011: 85). Evidence for North African oil appears in the archaeological record, alongside that of Spain, in the late first/early second centuries AD (Ibid. 86). Other measures were taken in order to guarantee a supply of oil to Rome. In 121 AD, emperor Hadrian issued a decree stating that a fixed percentage of Athenian olive oil had to be sold annually to the state (Meijer and van Nijf 1992: 114).

3. Wine was the primary alcoholic drink of the ancients. It was transported and supplied in a concentrated form only to be mixed with water prior to consumption. As is the case today, the quality of wine varied according to the location of the vines as well as on the vintage. Initially, Italian wine literally poured into the new provinces. Studies show the widespread dispersal of Republican amphorae throughout Gaul (Loughton 2003). Diodorus Siculus describes this large-scale export by Italian traders who saw the Gauls' love of wine as a godsend. (Figure 1) .The navigable rivers of Gaul were used to take the amphorae inland from the coast.<sup>3</sup>
4. *Garum* was essentially a sauce made from fish innards that was highly prized

in ancient times and was widely used in Roman cuisine. Large shipments of *garum* were sent from Spain and various parts of North Africa to satisfy demand in Rome. So popular was this product that some archaeological layers in Ostia and Pompei the amphorae known to have contained *garum* far outnumber those that carried oil (Harris 2011: 166).

There existed numerous other items including building materials and commodities that were transported by sea as well as overland. Commodities varied from 'lapis lazuli to lions' (Harris 2009: 263).

1. Slaves – the movement of people captured in the wars that brought about the conquest of new provinces fed into an economic system that used slaves for just about any chore in Roman society. Household servants, private secretaries, construction workers and farm hands for example were all drawn from the slave population. Overseas expansion by Rome brought about a massive demand for slaves that initially was partially fulfilled by pirates: '...the Romans, having become rich after the destruction of Carthage and Corinth, used many slaves; and the pirates, seeing the easy profit therein, bloomed forth in great numbers, themselves not only going in quest for booty but also trafficking slaves'<sup>4</sup>
2. Marble – although the Italian peninsula has deposits of luxury building materials such as Carrara marble Rome drew upon marble resources from a variety of places including Egypt, Turkey and Greece. Shipments of marble fed large-scale public building programs in Rome as well as other cities in the Mediterranean.
3. Metals mined and transported in Roman times varied from silver to lead. For example, in *Carthago Noua* (present day Cartagena, Spain) both these metals were 'dramatically

exploited beginning in the Republican period (Orejas and Sánchez-Palencia 2002: 581). (Figure 2 - ingots)

4. Luxury items such as spices from the Far East, exotic animals from Africa and works of art from Greece were transported from and to various corners of the Roman provinces. The Mahdia shipwreck was on its way from Greece to Italy when a storm blew it off course towards present day Tunisia. Besides amphorae and marble columns its cargo consisted of numerous pieces of Greek works of art, including bronze and marble statues, destined for the Italian market (Merlin 1911).

## MARITIME TRANSPORT IN THE ROMAN WORLD

Now that the main items of exchange have been listed and discussed it is pertinent to look at how these goods were moved. In antiquity there existed two major forms of transport – terrestrial or waterborne (rivers and/or sea). It is evident that despite the dangers related to maritime traffic, which included the natural elements and piracy, the ancients preferred transport by sea. Pompey the Great cleared the main pirate bases in Cilicia around 67 BC (de Souza 1999: 174). Thus, except for the random pockets of pirates, the seaways were relatively free for ships to sail without danger of being attacked. The cost benefits of transport by sea far outweighed dangers posed by adverse weather conditions. The costs for sea versus land transport stood very much in favour of the former (Meijer and van Nijf 1992: 134-135). This does not mean that road transport was neglected altogether. Some inland areas could only be reached by means of pack animals and carts. Furthermore, goods were often transported by a combination of means – river-sea-land for example – depending on the origin of the object and as well as its final destination. In the main, it is safe

to say that it was transport by sea that enabled the mass movement of goods from one corner of the Mediterranean to another. This is confirmed by Cato's advice to prospective landowners to purchase their estates with access to the sea, rivers or roads in order to facilitate the movement of produce.<sup>5</sup>

Whereas ships were the main form of transport the various goods and commodities listed above needed different forms of packaging and stowing. Wine, olive oil and *garum* were mainly shipped in amphorae – clay jars especially designed for maritime transport. Barrels and skins were also used for the transport of liquids but to what extent is hard to establish due to their perishable nature. Grain was transported in sacks and had to be kept dry in order to prevent rot. Building materials were carried as ballast or in purpose-built stone carriers known as the *naves lapidariae*, some of which could carry a cargo of over 350 tons (Boetto 2010: 123). The size of Roman transport ships was not standardized. Theories have been put forward which suppose that smaller vessels were used for coastal journeys whereas the larger ones carried out open water crossings (La Rocca 2012: 65). There may be some truth in this but in reality most sea journeys in the Mediterranean are a combination of open sea and coastal navigation (Arnaud 2011: 62-63). In imperial times, edicts were passed to incentivize the building of larger ships so as to satisfy the need to carry large volume of goods towards Rome. On average it is believed that smaller vessels could carry up to 100 tonnes of cargo, medium vessels 200 and larger vessels up to 400 (Casson 1995: 185-186 and Parker 1992: 26).<sup>6</sup>

The Archaeology of Trade and Transport  
The evidence for Roman trade is rich and diverse. Archaeology, both from terrestrial and underwater contexts shed light on the provenance of goods, destinations as well as routes used to deliver these goods.

Sites such as farmsteads, kilns and garum factories provide information on where goods were made. On the receiving end, archaeology from urban contexts tells us about centres of consumption. The example par excellence of such consumption is Monte Testaccio in Rome – a depository of millions discarded amphorae that forms a mound approximately 1000 meters in circumference and 35 meters high. These are fragments of imported Spanish and North African olive oil amphorae consumed in Rome (Rodriguez Almeida 1979).

Since the relatively recent rise of the sub-discipline of underwater archaeology numerous ancient shipwrecks (pre 1500 AD) have been discovered and studied. A seminal study by Parker (Parker 1992) put these at over 1000 but a recent assessment of shipwreck data puts the number at over 1500 (Wilson 2011: 34). Many of these shipwrecks are datable to the period under study and Parker's chronological analysis indicates a rapid rise in the incidence of shipwrecks starting around 200BC which drops off around 200AD (Figure

3). Although a recent re-working of these data alters the peak of shipping and brings forward the drop to approximately 100 AD it is still reasonable to assume that the overall increase in shipwreck incidence reflects a larger volume of shipping. This is based on the mathematical probability that all things being equal, more ships at sea will result in more shipwrecks.<sup>7</sup>

Archaeological remains from an underwater context do give us an indication of preferred routes, but one should be cautious. It would be mistaken to simply plot straight lines between centres of production and those of consumption using shipwrecks to complete the supposed routes. Wind directions, currents and other natural conditions all played an important role in the choice of sailing routes. Shipwrecks also provide invaluable evidence for shipbuilding techniques, stowage of cargoes and life on board ships. Other bodies of evidence for ancient seafaring include contemporary written sources and iconography. It is opportune here to advocate a note of caution. There is a clear bias in the archaeological record

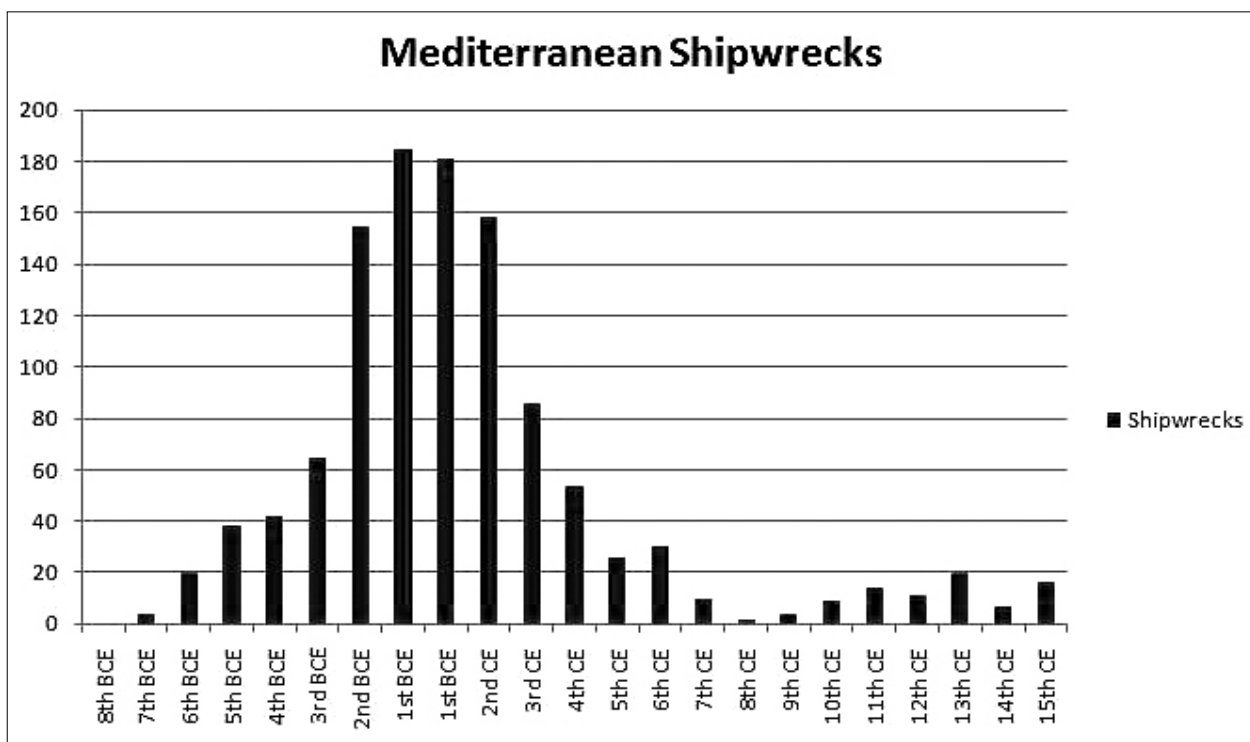


Figure 3. Xlendi

towards products that were carried in ceramic containers. This because containers made from organic materials such as wood (barrels) and cloth (sack) perish over time. Therefore, one must always keep in mind when looking at shipwreck evidence that the picture is incomplete and therefore possibly distorted.

Ships, goods and merchants operated within an infrastructural network specifically built to accommodate trade. Port complexes around the Mediterranean combined to form Rome's façade maritime (Purcell 1996). The invention of hydraulic concrete facilitated the construction of breakwaters and quays. Warehouses provided large-scale storage facilities for products. On the Italian mainland, Puteoli was converted from a naval to a commercial harbour. It was to serve Rome as its main port - 'retaining this position until the expansion of Ostia in the first century AD' (Morel 2007: 505). In Rome itself, a new river port was constructed with warehouses measuring over 30,000 square meters (Gros 1996). The culmination of this port network was the construction of Portus by Emperors Claudius and Trajan. This vast port complex acted as the nerve centre for a commercial network that connected all parts of the known world.

Considering what has been written we can therefore detect two main trends related to Roman trade between 200 BC and 200 AD:

1. The initial large-scale export of Italian produce towards the newly conquered territories – a trend that is reversed in the first century AD when Italy, and especially Rome, becomes the 'net receiver' of goods from all over the empire.
2. An increase in shipping as is reflected through shipwreck evidence and also from the proliferation of Roman ports and ceramic evidence from numerous land sites.

## IDENTIFYING MALTA'S MARITIME ROLE

In the context of this large-scale movement of goods between vast agricultural lands and urban centres of consumption – it is relevant to ask how a small island like Malta fitted into the broader framework. In order to better understand the possible parallels between Malta and the evolving economic realities of the Roman Mediterranean I have used three published ceramic assemblages, those from Tas-Silg, San Pawl Milqi and Xlendi Bay (Bruno 2009; Azzopardi 2006). Despite missing evidence from an urban site Mdina for example) the varied contexts of these three sites (1) Tas-Silg – maritime sanctuary; 2) San Pawl Milqi – rural farmstead/villa; and 3) Xlendi Bay – shipwreck and harbour debris provides a good overview of amphora imports and usage in Malta. (Figure 3 – Xlendi)

When looking at the amphorae and ceramics it is important to keep in mind the potential degradation of all three sites. For the terrestrial sites persons mining ancient ceramic fragments for deffun would have depleted the number of archaeological objects.<sup>8</sup> Up until the early 20<sup>th</sup> century local heritage authorities permitted the harvesting of ceramic fragments from archaeological sites.<sup>9</sup> On the other hand, the archaeological deposits at Xlendi Bay have been damaged by numerous illicit recoveries made by sports divers. These objects remain unreported to the local heritage authorities and are currently stored in private collections. It is clearly impossible to study items lost on these sites. One must therefore assume that what has been discovered in situ is still representative of the original deposits.

Looking at Bruno's quantitative graphs it is immediately noticeable that the peak in numbers for imported amphorae coincides with the period of study tackled in this chapter. This is true for both sites studied by Bruno. At Tas-Silg, late Republican



Figure 3. Xlendi

amphorae make up the largest number of pieces (45% of total study) whereas those from the early Imperial period make up the second largest group (17.5%). For the former assemblage the imports are divided in the following manner – North African 2.8% (of total study); Adriatic: 38.4% and Tyrrhenian: 53.4%. Early imperial amphorae are from the following provenances: Spain (4.6%); North African 41.5%; Aegean-Eastern Mediterranean 14.6%; Sicily 8.9%; Istria and Pandania 2.2%; and Tyrrhenian and Central Italy 7% (Bruno 2009: 131-132). At San Pawl Milqi, late republican amphorae make up 19% of all studied pieces whereas those from the early imperial period make up 27%. Once again these two periods provide the peak of imported objects. Late republican amphorae at San Milqi originate from North Africa 4.5%; Adriatic 25.6%; and Tyrrhenian 20.5%. Early imperial amphorae from this site originate from Spain 1.5%; North Africa 11.9%; Aegean-Eastern Mediterranean 11.9%; Sicily (?) 13.4%; Istria and Pandania 2%; and Tyrrhenian and Central Italy 8.4% (Bruno 2009: 156).

In her seminal study of objects from the Xlendi Bay area Azzopardi has determined (by typology) ten distinct ceramic assemblages (Azzopardi 2006). It is important to emphasize that these

groupings have not been referred to as shipwrecks because some assemblages have no more than two or three pieces and therefore cannot be referred to as such. However, the objects were present on the seabed and are thus indicative of imported objects reaching the Maltese islands. Of the 56 objects identified and catalogued, 28 (50% of total) date to the 2<sup>nd</sup> century to the 1st century BC. 24 of these objects are grouped as assemblage 5 and four as assemblage 6. Another four pieces (7.8%) are datable to 290-146 BC. Although the latter group is listed as separate (assemblage 4), Azzopardi deems it possible that these objects form part of assemblage 5. The origin of the abovementioned objects is as follows: – Tunisia (3.9%); Tyrrhenian (25.4%); Adriatic (3.9%); and local/possibly Adriatic (19.6%).<sup>10</sup> The only objects datable to the first and second centuries AD are those identified by Bruno as Malta type 2 (Bruno 2009: 107). Azzopardi does not list the quantities of this type found at Xlendi.

It is quite evident that one cannot observe the same patterns as those from Tas-Silg and San Pawl Milqi. The latter two are more indicative of a sustained occupation and utilization of a terrestrial site. On the other hand, underwater sites are more episodic and therefore a more irregular

PAPER 7 – *A drop in the Ocean - Malta's trade in olive oil during the Roman period*

deposit is to be expected. Despite this lacuna, the Xlendi deposits do however reflect the connectivity of the islands throughout the majority of the ancient period and the importance of this small harbour (Gambin 2004).

The peak in imports from San Pawl Milqi and Tas-Silg datable to the second century BC to the second century AD is a clear indication that the Maltese islands were fully integrated into the Roman maritime milieu. This situation is also reflected by the provenance of goods from these same periods. The Maltese islands are mainly receiving goods produced in Italy during the late republican phase and increased quantities from North Africa and the eastern Mediterranean in the early imperial period. The notion that Malta is integrated into Rome's façade maritime

is substantiated by the development of a formal port at Marsa that is probably datable to the first century AD (Gambin 2005).

Although the abovementioned assemblages indicate an increase in imports from Italy one must not assume that all of these got to Malta or Gozo via a direct route between the Adriatic and Tyrrhenian and Malta. Goods in transit from western to eastern Italy (and vice versa) may have been transhipped in southern Italy and/or Sicily to be moved southwards. One is not mutually exclusive to the other as vessels sailing south from Italy to North Africa could well have used the Maltese islands as a convenient stopover in their journey. (Figure 4 - Map)

Looking beyond consumable goods one

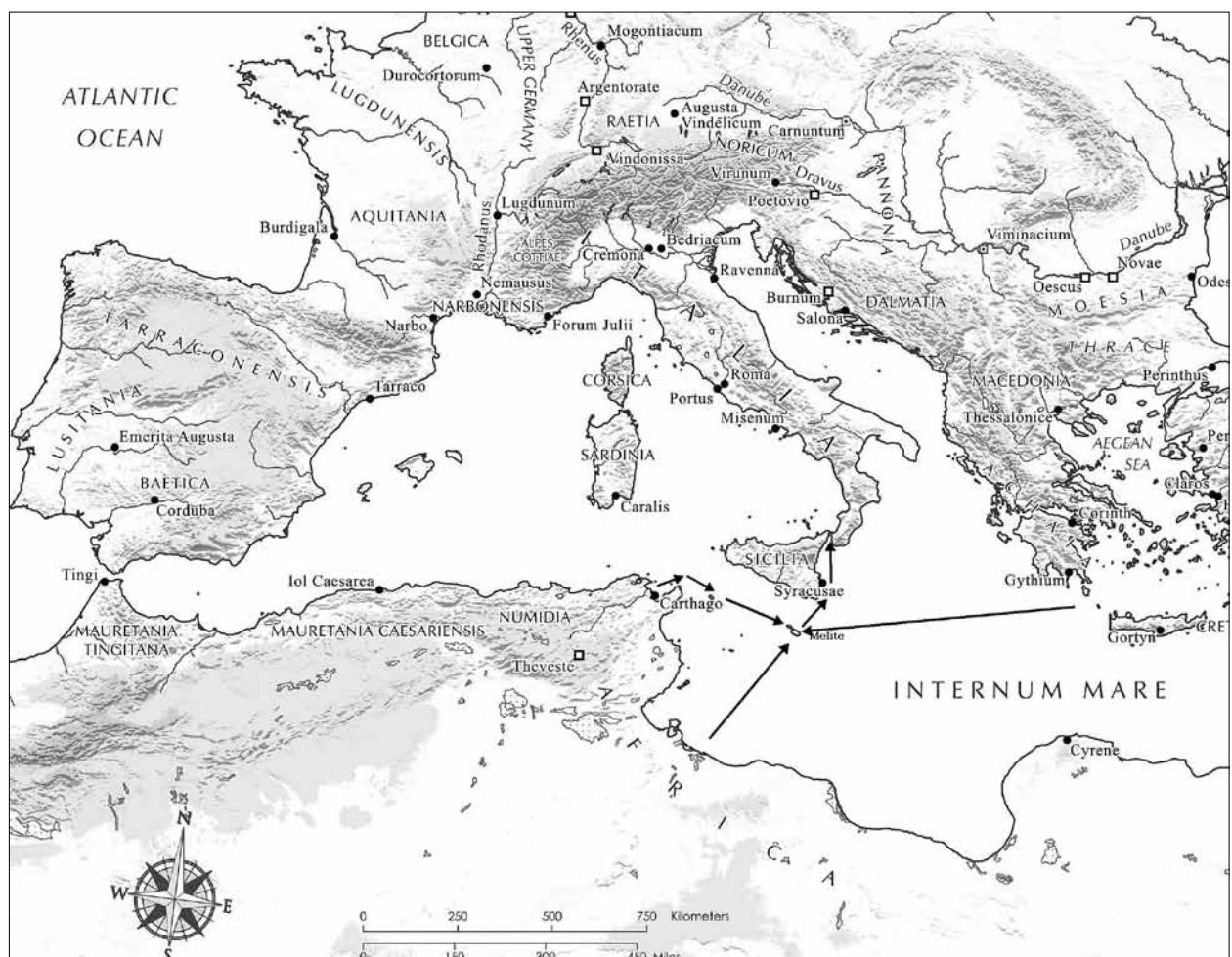


Figure 4



may observe other bodies of evidence such as architectural remains. Cardona has clearly illustrated that architectural features in the Maltese islands during the late republican period are in line with those in Sicily of the same period (Cardona 2010). Moreover the mosaics at the Roman domus in Rabat are similar in quality and design as others found on the Italian mainland. Malta's inhabitants must have been au courant with contemporary styles in Italy. A plausible explanation for this cultural affinity with Roman Italy and Sicily is that the elite, both original islanders and newcomers, were more receptive to Romanization.

## AGRICULTURE IN ROMAN MALTA

With regard to agricultural production, this was to change drastically in the first century AD. During the early imperial period 'the most important technological change affecting agricultural productivity involved the dissemination of olive and wine presses throughout the Mediterranean' (Kehoe 2007: 552). Large presses involved a noteworthy outlay of capital that would have required large-scale pressing in order to recuperate one's investment. There can be little doubt that this increase and intensification of olive oil production must have been brought about by the creation of new markets in dispersed hinterlands.

This new agricultural reality is very much present in the archaeology of the Maltese islands. Rural villas and farmsteads such as those at San Pawl Milqi, Ta' Kaccatura and Zejtun are all multi-period sites where Roman levels clearly overlay older Punic deposits and features (see chapter X this volume). The exact use of these sites during the Punic period is as yet still a matter of debate. For the first and second centuries BC mixed activities, including olive oil production, winemaking, honey

gathering and flax cultivation, may have taken place. However, it seems that this all changed in the first century AD. Evidence from a number of sites points to a major shift in agricultural practices. It is evident that significant parts of the island were converted to accommodate large olive groves. This conclusion has been reached by piecing together evidence for oil producing implements such as press beds, crushers and counterweights. The sheer sizes of these implements indicate that these were certainly not made solely for domestic use. If we take a typical farm as described by Cato (*On Agriculture* 10-11) this would equate to approximately 60 hectares. This may seem large in the Maltese context but when superimposed on a site the size of the Zejtun villa for example this size estate does not seem out of place. The large scale capabilities of these presses may also be indicative of communal pressing with owners of smaller groves in the vicinity bringing their harvest in for pressing. However, the clear industrial set up of San Pawl Milqi and its location close to a harbour clearly points to a large scale production of olive oil for export.

With a population of 14,000 people, the island would have had a consumption of approximately 140,000 litres of oil for food purposes.<sup>11</sup> If we double the amount to include oil used for lighting and other uses then this gives a total consumption of 240,000 litres per annum - this total equates to 6000 amphorae with a 60 litre capacity (Africana Type I). Consumption of grain, the other main staple, would have been approximately 1900 tonnes per annum. Ancient methods of production (two field system) would have permitted Malta to produce approximately 4700 tonnes of grain leaving a surplus of over 2000 tonnes.<sup>12</sup> These levels of production would have been possible if approximately 80 square kilometres of Malta's agricultural land was dedicated to the cultivation of grain. These are calculations based on years with

optimal conditions and no crop failures.

If a small proportion of Malta's agricultural land was dedicated to olives (2500 hectares/25 square kilometres) then annual production of oil could have reached somewhere in the region of 1.12 million litres or 18,750 amphorae with a 60 litre capacity (Africana Type I).<sup>13</sup> These conclusions are not without their problems. Firstly, if the grain crop in Malta failed, or was lower than that calculated, how could 14,000 inhabitants survive? Gozo, with a smaller urban centre than Malta and rich agricultural land could have partly alleviated the situation by supplying its sister island – Gozo being the bread basket of Malta. Maritime transport may provide another answer. The victory by Octavian over Anthony at Actium brought the productive lands of Egypt under Roman rule. Every year, hundreds of vessels sailed from Alexandria laden with grain en route to Rome (Rickman 1980: 120-134). There is ample evidence pointing to the use of Maltese harbours by Alexandrian grain ships. The clearest is the following passage from Acts 28 'Three months later we set sail in a ship which had passed the winter at the island. It was an Alexandrian vessel with the "Heavenly Twins" as its figurehead'. Further evidence can be gleaned from various archaeological discoveries recorded over the centuries. The large port complex in Marsa for example was probably utilized for, amongst other things, the storage of grain over the winter months. This would have been done in order to stop it from spoiling due to the damp conditions present on board the ships wintering in port.<sup>14</sup> Local *negotiatores* would have been able to purchase at least some of the grain stored locally in order to supplement local production.

A recent discovery from the seabed, an anchor with the double inscription *ISIS-SARAPIS* found off Qawra Point, continues to add credibility to the hypothesis of Malta as a winter stopover

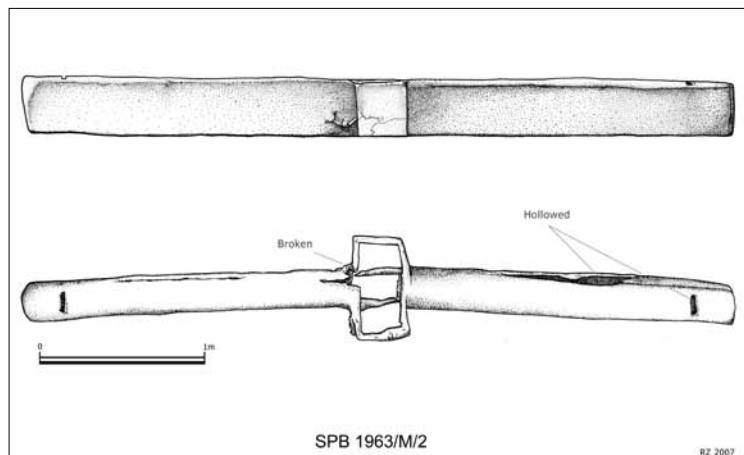


Figure 5

for Alexandrian ships. The centre for the maritime cult of the twin deities *ISIS-SARAPIS* was Alexandria (Fabre 2004: 200). Another anchor from the Qawra area measures over four meters in length and weighs over one tonne. It is highly likely that such a massive anchor must have belonged to one of the larger Alexandrian grain ships. (Figure 5 – anchor drawing)

The second problem related to large scale production of olive oil in Malta is the lack of amphora evidence including the total absence of Roman kilns. Although Bruno claimed she identified a Roman amphora datable to the early imperial period – evidence for its production and distribution is lacking. The former can be explained by the aforementioned persons who collected ancient shards for the making of deffun. Kiln sites, known for the abundance of ceramic deposits due to wasters, would have been prime areas for the harvesting of pottery fragments.

Furthermore, another problem related to amphora evidence is a near total absence of material that can reveal the true distribution of Maltese amphorae. If Bruno's Malta type II is indeed local then its absence from assemblages overseas can be explained. Given that until recently this type had not been classified then one would have to look into the boxes of pottery marked as unknown. However, it could well be that the

Malta type II was not the only amphora being used at the time. Given Malta's proximity to North Africa it is plausible that locally made amphorae were similar or possibly identical to those made by its neighbours. This would not be an exceptional or unique situation. Dressel 2-4 amphorae were initially made in Campania and exported throughout the Mediterranean. Within a few years, identical amphorae (in size and shape but not in petrology) were being made and exported from Spain (Keay and Jones 1982).

## CONCLUSION

Although we are certain that olive oil was produced and almost certain that it was commercially exploited (possibly as a niche product) – we cannot, due to lack of evidence, be sure as to where this surplus was shipped. This does not preclude the use of circumstantial evidence to try and locate potential destinations. The port complex at Marsa, imported ceramics from both terrestrial sites and underwater

all point to a respectable degree of maritime activity during the early imperial period. One must not underestimate the 'entrepreneurial spirit' of the time and despite the presence of locally produced goods – efficient maritime transport would have made it worthwhile to ship and sell goods overseas (Harris 2011: 281). Producers of local olive oil could easily have taken advantage of the presence of ships in local harbours to shift their produce to markets overseas. Given that Rome was the main destination of ships sailing north via Malta, then Sicily and Italy would have been the more likely.

This hypothesis is built on the archaeological evidence available in Malta for the large-scale production of olive oil. The secure way of confirming such a hypothesis would be through in-depth studies of ceramic assemblages from overseas sites. Another possibility is that unexcavated sites on the island may, once excavated and published, would shed further light on this subject.

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## FOOTNOTES

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- <sup>1</sup> Definition of trade from Oxford Dictionary: a. buying and selling; b. buying and selling between nations etc. c. business conducted for profit.
- <sup>2</sup> Seutonius, Claudius 18-19
- <sup>3</sup> Diodorus Siculus V.26.2-3
- <sup>4</sup> Strabo XIV .5.2
- <sup>5</sup> Cato On Agriculture translated by Hooper, W.D. and Ash, H.B. (Loeb Classical Library, 1934).
- <sup>6</sup> For the sake of clarity I here refer to the metric ton = 1000kg.
- <sup>7</sup> Here one must assume that three main factors remained relatively unchanged during this period: 1) meteorological conditions; 2) shipbuilding technology and 3) navigational instruments. In all three cases there is no concrete proof that denotes major changes in any of these three factors.
- <sup>8</sup> Deffun was a traditional waterproofing compound widely used in Malta. One of the main ingredients for this compound was ceramic fragments.
- <sup>9</sup> See Museum Annual Reports 1931-31: 4.
- <sup>10</sup> The uncertainty is caused by Bruno's identification of a Malta Type 1 as Azzopardi believes that these are more like to be Apani VII type amphorae from the Adriatic (Azzopardi 2006: 121).
- <sup>11</sup> The population figure was calculated using a formula developed by Wilson for Roman Sicily (Wilson 1990: 171). The average consumption of olive oil when taking into consideration all strata of Roman society was about ten litres per capita.
- <sup>12</sup> Varro (1, 44) gives a yield of approximately 1.56 tons per hectare.
- <sup>13</sup> These calculations are based on the following numbers: 180 trees per hectare as written by Cato; an annual fruit yield of 25kg per tree; and an oil yield of 10%. These numbers would have fluctuated annually due to the elements.
- <sup>14</sup> Grain cannot be stored in an environment with over 15% humidity.