



Naval transport, ports and routes in the imperial age: An analysis of the circulation of marble in Roman times

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Abstract

This is a study of the complex circulation of marbles during the Roman age and its implications as part of the project, “The Emperor's Architecture. Official and private residences, urban landscapes and ports in the age of Hadrian (117-138 AD)”. This topic has already been explored by many scholars in the past but without a comprehensive view on the technical aspects related to this trade.

A team analysed the main characteristics of such sea transits, particularly the complexity of the sea routes. Various other aspects were also examined, from the systems and methods of transport, with attention paid to the type of boats used in this trade, to the definition and indication of the marble supply sources and the travel times of these heavy cargo ships.

The analysis of each of these aspects has revealed how, despite much research, there is still an insufficient level of knowledge. Although the methodology of this study still presents several problems to be solved, an attempt has been made to provide as broad a picture as possible of the available sources. Without claiming to be decisive, the writers have applied a new approach to the analysis of the sources, contextualising the circulation of marbles bound for Rome within the general framework of commercial traffic in the Roman world. To this scope, it was essential to compare both the maritime and terrestrial archaeological evidence as well as the main types of marbles used during the imperial age with other products following similar routes. Despite the variations of these routes over time due to historical, social and economic factors, it has been possible to make a first attempt at a unitary and comprehensive understanding of the problem. These preliminary results will benefit from further examination in a diachronic perspective with the investigation of new evidence and discoveries.

Keywords: Marble transport; Hadrian era; Maritime routes; Mediterranean

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Methodology

Given the complexity of the proposed approach, it was necessary to collect a large amount of data of a different nature from literary, epigraphic, iconographic and archaeological sources.

Concerning literary sources, the authors first examined the well-known passage of Petronius (Satyricon, 117) mentioning a ship carrying marble. This passage, generic and with obvious satirical purposes, has been frequently referenced in the definition of lapidary ship (Gianfrotta 2016). Many scholars have wrongly believed that this defines a specific type of ship with certain features. However, we believe that the most interesting aspect is the discussion of a slow and complex maritime journey. Another relevant source is Pliny the Elder (N.H. 16, 201 ff.; N.H. 32, 1,2), who mentions ships carrying marble but, once again, no specific reference is made to the elements that characterise these vessels. This suggests that there was no specific type of vessel but that modifications were made to standard cargo boats to accommodate heavy loads in the transport of marble.

What is more evident in the written sources is the fact that these ships conducted slow and rather complex journeys. Also significant are some passages that indicate ports or areas that played a decisive role in the marble trade and related issues concerning the transportation of marble. Among these texts

is one which mentions the proconsul L. Antonio Albo (146-147 AD) (Gianfrotta 2008, p. 77) placing a ban on marble and wood laden ships overburdening the docks of the port of Ephesus. Another text reports the request of Pliny the Younger in a letter to Trajan (Epistole X. 41-42; 61-62), to build a canal between Lake Sophon and Nicomedia (Gianfrotta 2008, p. 77, n. 5; Pensabene 2013, p. 152) to make marble transit easier to the port city. Finally, we can add to this group of texts the letter from Aurelio Isidoro to Diocletian, which mentions the use of ten boats of the *cursus publicus* for the transport of stones from Aswan (Gianfrotta 2016, p. 354, n. 75).

About the iconographic aspect, the most relevant reference is the collection of boat representations examined by Lucien Basch (1987, pp. 418-498) as well as the well-known boat representations in the Piazzale delle Corporazioni in Ostia (Mustakallio - Karivieri 2020, pp. 73-82). The depiction of a boat carrying columns or blocks, identified on the Arch of the Merchants' market in Leptis Magna (Beltrame, Vittorio 2012, p. 142, figs. 20.1-2.) is of great interest in this study. Concerning the river transport of marble, the relief at the base of the Tiber River representation from the Louvre Museum, shows a hauling scene which is significant too. On this relief is represented a flat-bottomed boat with a block of marble on board, pulled with ropes by three or more people from the riverbank (Pensabene 2017, p. 491, fig. 9).

In terms of sources, overall, the archaeological evidence provided the greatest contribution to this study, starting with the wealth of knowledge that the numerous wrecks offer, the well-known work by Parker (1992), as well as the Strauss update (2013) carried out within the "Roman Economy Project" of Oxford University. Thanks to these fundamental contributions it was possible to have an overall picture of the known wrecks (1784 in total), which have a chronology ranging from Prehistory to the 15th century. Starting from this evidence of shipwrecks it was possible to further refine the research, identifying the wrecks affected by loads of stone material and then proceeding to their analysis. From this first scanning of all wrecks from late Republican to Late Antiquity (2nd century BC - 7th century AD), it was possible to identify 121, most already mentioned in the contributions by Russell (Russell 2013a, pp. 114-118; Russell 2013b, pp. 332-341). However, other evidence emerged from the database created by Strauss, and these were added (see the list of wrecks relating to Fig. 1).

The problem of the discrepancy between the types of marble indicated by the various authors was addressed by reporting the main hypotheses in a dedicated database, including pending future analyses that could offer new interpretations.

From this a distribution map of the wrecks was developed; distinguishing between the sites whose stone loads are the subject of archaeometric analyses and those for which no such analyses exist (Fig. 1). As emerged from recent research by the Ca' Foscari University of Venice, directed by Carlo Beltrame, the archaeometric analyses were fundamental to clarify the hypotheses advanced in the preliminary studies (Beltrame 2021, Beltrame, Antonelli 2020, Beltrame, Cipollato 2019; Beltrame et. al. 2021, Beltrame et. al. 2020; Beltrame et. al. 2016; Beltrame, Lazzarini, Medaglia 2012; Delli Santi 2019). For this purpose, it was decided to highlight in the database the lithoid identifications verified through subsequent analyses.

From the total number of wrecks investigated, we moved to a considerably smaller number, selecting only marble and excluding the other materials that did not seem to be included in the routes to Rome, but tended to be limited to local circuits. However, this operation allowed an exhaustive sample of wrecks (56), from which a first diachronic diffusion map could be obtained. The data that emerged, albeit over many centuries and conditioned by the numerous variables deriving from the nature of the wrecks, is indicative of the main transit areas and some of the routes.

This first general map (Fig. 1) also considers all the possible marble variables indicated by the various authors. The enormous interpretative difficulty that the autopsy analysis of some marbles entails is even more complex underwater, therefore it was decided to exclude generic terms (e.g. white marble with dark veins), as they do not give any relevant contribution to the evaluation of the precise areas of origin of these products.

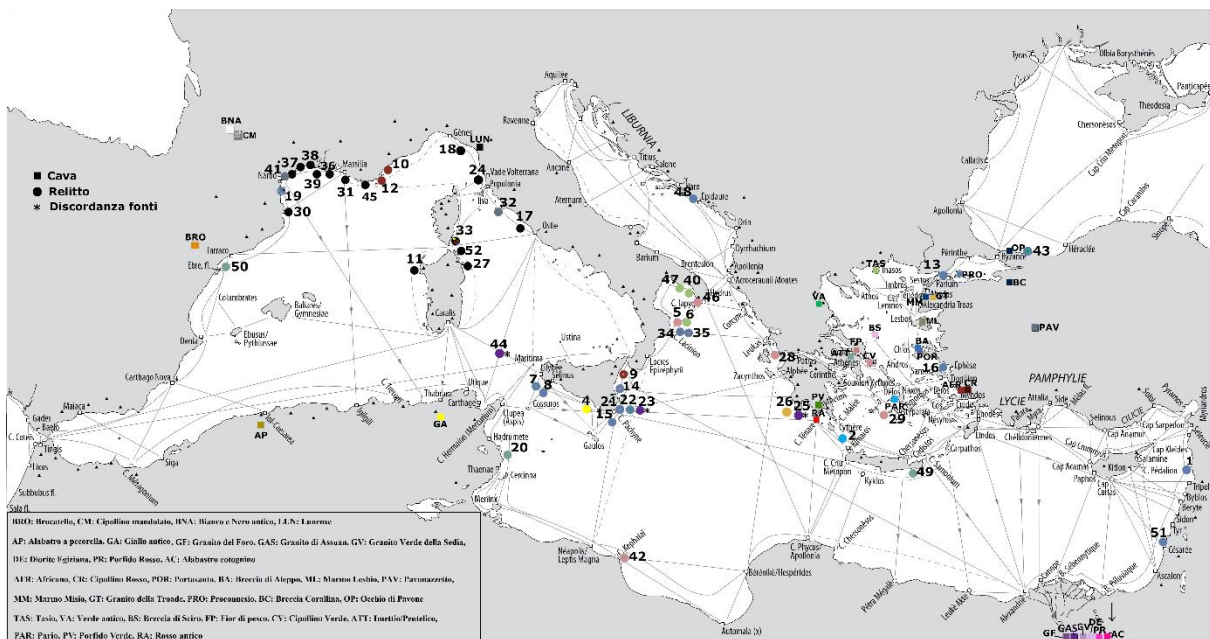


Fig. 1 - Map of the Mediterranean basin with indication of the main marble quarries and wrecks covered in the text. (Reworked by G. Borriello from Arnaud 2005)

The data that emerged from this cartographic representation confirms what Russell (2011, pp. 142-143) stressed on a general level: an absence of wrecks with western types of marbles in the eastern Mediterranean and abundance of wrecks with eastern types of marbles in the central Mediterranean and to a lesser extent in the western sector.

From a chronological point of view, these wrecks are generally in the middle of the Imperial age, during the 6th century AD. The data collected shows an increase in these exchanges, which began in the 2nd century AD, making this chronological range of key relevance. Examining this broader chronological period offers some distinct advantages, setting the Hadrian period in a broader picture, highlighting its similarities and differences compared to the other chronological phases and furthermore, increasing the spectrum of contexts useful for understanding the phenomenon of marble transport in antiquity. Although there are limits to a standardised interpretation due to the historical, social and economic differences that characterised the various centuries examined, it is essential to try to balance between common elements and variability. Therefore, first a unitary interpretation of the phenomenon of marble transport was attempted followed by examination of the individual chronological phases which, it is hoped, can be detailed in the future with further analyses.

Once a marble was associated with a specific area of origin, its spread was analysed. The various works by Lazzarini (2004, 2007, 2010, 2019) and Pensabene (1995, 2013a) as well as the recent updates by Russell (2011, pp. 139-155; 2012, pp. 533-539; 2013a; 2013b, pp. 331-361) and Toma (2020) were of fundamental importance to this aim. There was also a need to expand the analysis to the diffusion of marbles by land, since the underwater context often presents obstacles also because some transport was quite site-specific in terms of the activities at the destination. The analysis of these aspects does not give definitive answers on the main routes, rather, it provides an overall picture from which to start speculation. For the distribution of the different types of marble quarries in various sites, a database was also produced. It enumerates 207 sites in the ancient Mediterranean: 32 different marbles of Greek, Asian, African, Gallic, Hispanic, Egyptian and Italic origin were identified. Starting from this data, it was possible to proceed with the definition of the principal land and sea routes for the diffusion of marble in each provincial area (Fig. 1).

In this evaluation, consideration was also given to the collection of data relating to the routes followed by other goods. While there is no doubt that the marble products had a diffusion that followed more linear guidelines, which included mostly technical stops, it should not be forgotten that routes are also decided by established practices and familiarity. An overall picture can be traced thanks to the work of Reynolds (1995), who had already identified and discussed the main trade circuits and diffusion of products in the Mediterranean during Late Antiquity, and thanks to the most up-to-date research on commercial exchanges in the eastern Mediterranean (Leidwanger 2020; Leidwagner, Knappett 2018; Alberti 2018). To have an overall idea as complete and current as possible, a list of publications on the main products that circulated on the same routes was collected. Among these publications, an interesting contribution is constituted by the summary work of Opdebeeck (2005) on the amphorae present in Roman wrecks.

With the definition of the most significant marble supply basins and the association with other provincial products circulating on the same routes, it was possible to propose five different directions. The areas of origin of greatest interest were: Tarraconensis (northern Spain) and Aquitaine (western France), Etruria (Tuscany), Proconsular Africa (Tunisia) and Mauretania Caesariensis, Egypt, Achaia (mainland and insular Greece) and the province of Asia (Turkey). Each of these areas has been connected to Ostia / Portus through one of the main known routes (Fant 2001; Fant 1992; Fant 1988). With this system it was possible to verify both the major lines (e.g. D.1) and their variants (D.1.1). Despite the mandatory nature of some sea transits, the seasonal changes and in general the weather and sea conditions undoubtedly determined variations on routes. Noting that there was no single route which connected one port to another, it was appropriate to define the main variables adopted at certain times of the year or in certain historical periods.

The overall picture that emerged from this preliminary definition of the routes made it possible to distinguish between linear routes and those subjects to change (e.g. Luni - Ostia / Portus; Cartagine - Ostia / Portus), from those significantly affected by seasonal changes (Alessandria - Ostia / Portus). In some cases, significant variations do not seem to persist, perhaps for logistical reasons, in others, the variability seems to be almost regular due to the meteorological nature of the route being taken into consideration.

For the study of ancient routes, as well as the times and methods of navigation during the year, the studies of Pascal Arnaud (2005, pp. 149-230) and Stefano Medas (2018) were mainly taken into consideration. In addition, recent works were also considered, which mainly concerned circulation in the eastern Mediterranean (Wilson et al. 2013; Leidwagner, Knappett 2018; Leidwanger 2020). However, of these works, the most appropriate was the contribution of Arnaud (2005), in which the main routes of the ancient Mediterranean are defined mainly based on written sources. The proposed reconstruction is therefore based on the routes defined in this study, which, thanks to its flexibility, lends itself to the reconstruction of routes which, although characterised by a long journey, constitute a set of multiple segmented routes.

Routes definition

Below are the five main routes with their respective variants, conditioned by both practical and technical needs. The known shipwrecks identified along the routes are indicated and there is a brief discussion on the main variations in relation to the diffusion of marbles and other goods that presumably circulated on the same routes (Fig. 2).

D1 (Tarragona - Ostia / Portus)

This main route incorporates the transport of marbles from Tarraconense (broccatello), from Gaul (bianco e nero antico, cipollino mandolato) and from Etruria (lunense). For the comparison with the other classes of materials, comparisons were applied mainly with Hispanic, Gaulish and Tyrrhenian

amphorae, as well as with the diffusion of the Sigillata, Hispanic, Gaulish and Italian (Arezzo and Pisan) amphorae.

The route variations identified in this case are essentially four:

D1.1: it is an alleged route, not attested by any sources but likely, as it was closer to the coastline, starting from Tarragona, presumably going towards Narbonne and Marseille (Arnaud 2005, pp. 165-166), from here towards Luni and then proceeding southwards, along the Tyrrhenian coast, up to Ostia / Portus.

D.1.2: this route is as the previous one up to Narbonne (Arnaud 2005, p. 157), after which it cuts the Gulf of Lion up to Marseille (Ar.3b), from here it hypothetically continues towards northern Corsica, to arrive at the Etruscan coast, to then resume the journey towards the Lazio region (Arnaud 2005, p. 56-57).

D.1.3: this route constitutes the final journey of the previous routes and consists only of the coastal stretch from Luni to Ostia / Portus. It was the path that presumably followed the lunense marble in its diffusion towards south.

D.1.4: this route is the last variant which seems to be the least prudent, considering that from Tarragona it cuts across the western Mediterranean and passes through the mouth of Bonifacio (Ar.31) (Arnaud 2005, p. 165), a traditionally difficult area to cross (Boetto 2012, pp. 163-170). However, it is not unlikely that in some cases this route was also chosen for the transport of marble, despite the difficulties entailed.

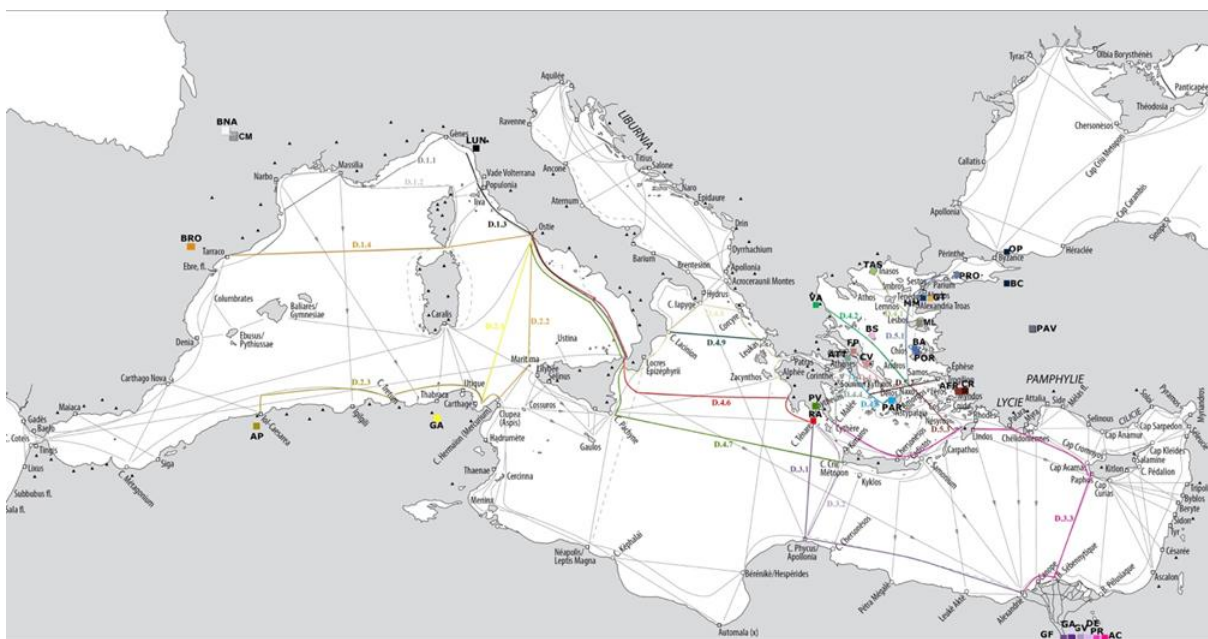


Fig. 2 - Map of the Mediterranean basin with indication of the routes and their respective variants. (Reworked by G. Borriello from Arnaud 2005)

Numerous shipwrecks with marble loads are highlighted along these routes, although almost all of them transported a cargo of marble originally coming from Rome or the eastern Mediterranean and directed towards the western provinces. At present, there seem to be no known shipwrecks with western marbles bound for Rome.

To compensate this lack, other shipwrecks investigated along this route, as well as the land diffusion of both the marbles and the other goods, were considered. The analysis of the other products includes mainly foodstuffs, which, as evidenced by the numerous amphorae, were widely distributed among the western provinces and the Italian peninsula. There was fervent exportation of wine, oil, fish sauces from Baetica, e Tarraconensis, from Gallia Narbonensis and Lugdunensis, as well as from the northern

Tyrrhenian coast. Another significant product is the fine ceramics, especially terra Sigillata, which was produced in these same areas and had a wide diffusion on the Italian markets.

What emerges from this review is a widespread diffusion of Hispanic and Gaulish products confirming the presence of a route very close to the coast (D.1.1), the other variant also being widely used (D.1.2). This can further be confirmed by the scarce presence of broccatello marble along the Gallic coasts.

To a lesser extent, there were more direct and risky transits, such as the one from Tarragona to Ostia, through the Strait of Bonifacio (D1.4). As far as the Luni marble is concerned, the stretch along the Tyrrhenian coast seems to be exclusive (D1.3) as the only shipwreck with Luni marble is south of Luni (Ladispoli B).

D2 (Carthage - Ostia / Portus)

This route does not seem to undergo considerable changes during the year, since the weather and sea conditions do not seem to prevent navigation of the examined stretch at any time. The most common marbles from this area are: alabastro “a pecorella” (Mauritania Caesarienses) (Herrmann, van den Hoek 2014, pp. 1319-1323) giallo antico (Ardeleanu 2018, pp. 155-165), greco scritto, grigio morato and the “lumachella orientale” (Proconsular Africa), even though there is a limited number of useful evidence available to understand the distribution of these products. As for other goods circulating and Tripolitania were also examined, especially from the 1st century AD as they began to circulate more widely towards the Italian peninsula. A look at the wrecks in which African products are confirmed, has allowed us to trace, with a good margin of error, the route most travelled by these boats, which presumably was the same one used for the transport of marble. An example of this, is the recent work by Bonifay (2017, pp. 338-340, see p. 338, fig. 11.4; Bonifay, Tchernia 2012), who tries to identify three different types of trips, the first of which, part of the imperial economy, seems to overlap well with what has also emerged from the distribution pattern of the marble and ceramic products made in this area.

For this section there are no known shipwrecks carrying marbles of local origin, the only attestation found on this route is that of the Skerki Bank F wreck, in which either Troad granite or Aswan granite is attested, marbles that do not originate from this area. The only reference to local marbles is the shipwreck of Camarina A (Di Stefano 2003; Di Stefano 2016), which carried columns of ancient yellow, whose destination is still in doubt.

D.2.1: this defined route seems to follow a rather linear route, which cuts across the southern Tyrrhenian to presumably head directly to Ostia / Portus (Ar. 22) (Arnaud 2005, pp.162-163).

D.2.2: this second route is like the previous one, although it differs in its greater proximity to the west coast of Sicily (Lilibeo), which according to the ancient vision was located on the vertical axis that connected Rome to Carthage.

D.2.3: this third variant, starts from the port of Iol-Cesarea, where alabastro a pecorella was likely loaded, to continue along the Algerian coast to Carthage (Ar. 42/43) (Arnaud 2005, p. 169), to then join one of the previous routes.

What emerges is a substantial linearity of this section, characterised by a rather direct route, which rules out many intermediate stops (D.2.1). However, doubts remain that in some cases a transit from the Strait of Messina was preferred (Flesca 2002, p. 1040), as with the wreck of Camarina A (Di Stefano 2003; Di Stefano 2016), although such journeys do not seem the norm.

D3 (Alessandria - Ostia / Portus)

The route from Alexandria represents only the final stretch of a route that brought stone material from the quarries of Aswan or Mons Claudianus, across the Nile River to the Delta and then to Alexandria. The variants of this course are many, as they are strongly influenced by the meteorological variables during the year. Several lithotypes were widespread from this area, however, in this preliminary study, reference was made to the six most attested: alabastro cotognino, Egyptian diorite, granito della sedia, Aswan granite, granito del foro, porfido rosso.

As regards the shipwrecks, only three corroborations are available (Marzamemi C, Methone C and Skerki Bank F) (Tab. 1), for which discrepancies between the sources persist, making, for now, more complex the definition of at least one route. In the future, archaeometric analyses could clarify this issue. About the diffusion of other products of Egyptian origin, we essentially recognise amphorae (Dixneuf 2011, pp. 391-393, figs. 191-193) and rare fine ceramics, scarce in the ancient Mediterranean. In part, the Cypriot Sigillata (Bes 2015, pp. 68-76; figs. 54-55) travelled on the same route, which in spreading to the west, seemed to have preferred a transit along the Libyan coast rather than crossing the central Aegean.

D.3.1: this route seems to follow the Libyan coast at least as far as Apollonia, continuing north to Cape Matapan (Ar. 55) (Arnaud 2005, p. 186) and then to the Ionian islands, where the crossing made it possible to reach Cape Pachino and through the Strait of Messina, to reach Ostia / Portus (see D.4.7).

D.3.2: this route is similar to route D.3.1, except for the section between Apollonia and Capo Crio which replaces the section up to Capo Matapan (Ar. 57) (Arnaud 2005, p. 187).

D.3.3: following the direct route to Cyprus (Ar. 111 / Ar. 99), then towards the Chelidonia islands (Ar. 107 b) and Rhodes and then transits north or south of Crete (Ar. 102a / 102c), where it re-joined the previous one (D.3.1).

D.3.4: similar to route D.3.2, but with an extension along the Ionian coast to Corfu, continuing on the Salento coasts (see D.4.9).

The set of data analysed seems to present a greater variety of routes, which at times seems to continue westwards, and then towards Crete (D.3.1, D.3.2), while in other cases it seems to continue north-east, touching Cyprus and then arriving in Rhodes (D.3.3), the route D.3.4 seems rather rare, as no reliable data is available. These substantial differences, in the absence of more precise data, seem to be affected by the meteorological conditions, almost always prohibitive for a direct route to Crete or even Sicily.

D4 (Athens - Ostia / Portus)

One of the most complex directions to define is that relating to Greek marbles, on the one hand for the variety of areas that produced marble products in the peninsula and in the islands, on the other, for the fact that much of the route was certainly common to the routes that originated in Asia Minor (D5). The choice of Athens as a starting point for this route is dictated by the role played by the city throughout its history and in the Hadrian period. For this reason, it was preferred to define routes that included a transit in Athens, although it is plausible that it did not always take place with the same boats that travelled the entire route. Obviously, the Peloponnesian marbles and perhaps the Thasian marble, which did not necessarily have to transit through Athens, are an exception.

The main lithotypes circulating along this route were: Thasian marble, verde antico, cipollino, fior di pesco, breccia di Sciro, imettio and pentelic marble, parian marble, naxian marble, rosso antico, porfido verde.

The total of known shipwrecks for this route is undoubtedly the highest among those discussed so far. A significant number of these shipwrecks had cipollino marble on board, attested in the wrecks of Polyagos (Aegean Sea), Palairos (Ionian Islands), Torre Chianca, Capo Cimiti (Ionian Sea) and Giadini Naxos (Tab. 1). In this last case, cipollino seems to be associated with proconnesian marble. Another marble that seems to be characterised by a moderate diffusion is the Thasian marble present in the wrecks of San Pietro in Bevagna and Torre Sgarrata, as well as in the wreck of Capo Colonna-Cicala (Ionian Sea) (Antonelli et al. 2020). To these it should be added a load of Attic marble found in the context of Marzamemi A and one of Parian marble at Anticytera A. A final attestation concerns the shipwreck of Marzamemi B, in which verde antico associated with Proconnesian marble is attested (Tab. 1).

While the spread that these materials had is well known, more complex is the identification of ceramic or other goods that were widespread in the imperial age. Nevertheless, some production can be found in the Corinthian Roman Relief Ware: (Malfitana 2007), in the common Peloponnesian ceramics (De Mitri 2013, 1.15) and in the Cretan amphorae (Marangou Lerat 1995), for which we have updated studies. For

the rest, the various ceramics produced in Greece over the previous centuries and widespread in the ancient Mediterranean were also considered for a wider perspective.

The diversity in origin of the listed marbles has led to the creation of many sections, nevertheless many of these appear to have been characterised by the same routes, which are often common to those coming from the Asian area. Among the routes mentioned below, the last three routes constitute further variants which seem to be common to the main routes D3, D4 and D5.

D.4.1: conspicuous doubts persist on the stretch that connects the marbles of the island of Thasos to one of the last two routes (D4-D5). The data available to us highlight a strong link between the island and the coasts of Asia Minor, which for several centuries have been supplied with Thasian marble (Littlefield 2012, pp. 37-42; Barresi 2013, pp. 360-362); therefore, it is plausible to believe that a part of the marbles heading west first passed along the Asian coast, towards Lemnos and Lesbos (Ar. 122) (Arnaud 2005, pp. 227-228), and then crossed the central Aegean (see D.5.1).

D.4.2: this section is also complex to reconstruct, especially due to the limited data available. The route presumably originated in Volos in Thessaly, and then continued off the Sporades (Ar. 120) (Arnaud 2005, p. 227), touching Sciro, Andros and Delos (Ar. 114), then arriving in Athens.

D.4.3: a similar path can be identified for the products of the Euboic quarries, probably starting from the port of Carystos, continuing towards Attica (Ar. 117) (Arnaud 2005, p. 227).

D.4.4: this route, starting from Attica, essentially concerned the imettio and pentelic marbles, with Piraeus as the presumed port of departure. From the Athenian port the route had to continue towards the Peloponnese then cross the Ionian Sea.

D.4.5: as regards the circulation of insular marbles, the routes essentially concerned Nassio and Parian marble, for which it is equally plausible to recognise a passage towards Athens (Ar. 114/115) (Arnaud 2005, p. 226), followed by a transit as for route D.4.4. Nevertheless, a southern section in the direction of Crete, under certain conditions as far as Sicily, seems probable (D.4.7).

D.4.6: the Peloponnesian marbles (verde antico, rosso antico), not requiring transit from Athens, plausibly continued their journey, rounding Cape Matapan and then crossing the Ionian Sea at the height of the western coast (Ar. 48) (Arnaud 2005, pp. 175-176) or alternatively following the routes D.4.8-4.9.

D.4.7: the transit to Crete had to include a highland crossing (Ar. 50), with a more direct route between Capo Crio (Crete) to Capo Pachino (Sicily).

D.4.8: this section (Ar 87) (Arnaud 2005, pp. 200-201) provided for a passage at the height of Corfu and then towards Salento followed by a cabotage route along the Ionian coast of Calabria.

D.4.9: more direct than the previous one, this route cuts the Ionian at the height of Lefkada (Arnaud 2005, pp. 174-181) and then reaches Capo Lacinio and then the Strait of Messina.

The transits reported so far seem to be mainly characterised by proximity to the coast, as demonstrated by the analysis of the distribution of the ceramic classes considered. If for the archaic productions we witness rather safe transits, at the height of the Otranto canal (D.4.9), over the following periods we gradually witness the passage to a high-sea navigation and to the crossing of the Ionian, also at Cape Matapan (D.4.7). The evaluation of the distribution maps of Peloponnesian Coarse Ware and Corinthian Roman Relief Ware finds a diffusion that seems to respond better to transit (D.4.8). However, the diffusion of Cretan products is interesting, apparently for these we can find a rather direct diffusion for which we would not expect a transit along the western coast of Greece.

The overall picture is rather complex, since the coast of the western Peloponnese is essentially characterised by the most common marbles (rosso antico, Attic marbles, pavonazzetto, cipollino and breccia di Sciro), while other marbles seem rare, Greek, micro-Asian and Egyptian marbles. These absences, which are also reflected in the provenance of the other imported products analysed, could be an indication of a limited passage in these areas. Nonetheless, the presence of more direct transits between Crete and Sicily (D.4.7) or the possibility of passing through the Gulf of Corinth, at least for some products, could be one of the plausible reasons to explain these gaps in the analysed data.

D5 (Nicomedia - Ostia / Portus)

The last route is undoubtedly the one on which the most consistent number of marbles passed. Asia Minor has always been one of the most important areas for the production and subsequent distribution of marble. Also, in this case the choice of Nicomedia is conventional and highlights one of the longest journeys in the diffusion of this marble (Ward-Perkins 1980). Certainly, other important ports of departure were those of Ephesus (Bouras 2011) and Smyrna (Barresi 2013), which played a role in the diffusion of marble from the quarries inside Anatolia. The lithotypes of greatest diffusion in the period examined were also examined for this direction: *occhio di pavone*, *breccia corallina*, *proconnesian marble*, *misio marble*, *violet Troad granite*, *grigio morato*, *breccia di Aleppo*, *portasanta*, *africano*, *Lassense marble*, *cipollino rosso* and *pavonazzetto*.

The variety of marbles from this area is not reflected in the shipwrecks identified so far. In addition to the doubts arising from the scarce presence of contexts verified with the use of archaeometric analyses is the prevalence of some marble products. Undoubtedly the most common is the Proconnesian marble present in the shipwreck of Ekilink Adasi (Sea of Marmara), Kizilburun 1 (Eastern Aegean), Giardini di Naxos, Isola delle Correnti, Marzamemi B, Capo Granitola A and D (Sicily), Punta Scifo A and B (Calabria). In addition to this marble, the *pavonazzetto* was widespread, attested by both the shipwrecks of Punta Scifo, as well as the *Africano* marble present in the wreck of Capo Taormina (Sicily), and in some finds in southern Gaul (Chretienne M, Dramont I and Porto Novo) (Strauss 2013).

Compared to the directrix from Greece, more products are known circulating from this area to the Italian peninsula. Of great importance in the reconstruction of these trades are already the *rodie*, *coe* and *cnidie* amphorae (Sauer 2018, pp. 33-41), circulating especially during the middle and late Republican age, to which we can add the numerous amphorae produced in Cilicia that during the first and middle imperial ages had a wide diffusion on the Italian markets. These products can be combined with fine tableware ceramics (Eastern Sigillata B and C), produced in different areas of the Anatolian peninsula (Bes 2015). Despite the large number of marbles examined, the main ports of departure seem relatively few, which has allowed the creation of a smaller variability of the routes.

D.5.1: presumably a series of products extracted from the area surrounding the Sea of Marmara departed from the port of Nicomedia or Cyzicus, among these we can mention: the *peacock's eye* and the *coral breach*. Proconnesian marble spread from this same area (Dalla Rosa 2021 pp. 88-90), presumably from the port of Saraylar (Karagianni 2011-2012, p. 18). The route, continuing along the eastern coast of the Aegean Sea, reached the Troad where, probably from the port of Alexandria of the Troad, *misio* marble and *violet granite* spread. *Gray marble* was loaded near Lesbos, to reach Chios from which the *portasanta* marble and the *Aleppo breccia* came.

D.5.2: a central role was undoubtedly played by the ports of Ephesus and Smyrna, which most likely constituted the starting points for the marbles produced in Phrygia (*docimeno* / *pavonazzetto*), as well as those coming from the area of Iasos (*Africano* and *cipollino rosso*). The route involved the crossing of the Aegean Sea (Bouras 2016) in its central sector, touching Delos and then reaching Attica, and then continuing along the routes examined in the D4 direction.

D.5.3: the last variant found follows a more southern route and allows the connection between section D.5.2, and D.3.3, connecting Samos to Rhodes.

The analysis of the ceramic products highlighted a good circulation along the coast in a north-south direction, moreover it was possible to note how the products from Cilicia are directed on the Ephesus-Athens route (D.5.2), while those of the *pergamenian* area often seem to pass through Crete, according to an alternative route that avoided the transit towards the Cyclades, to proceed towards the south (D.5.3).

These data are not necessarily reflected in the marble products analysed, among which a transit towards the central Aegean towards Athens is prevalent (D.5.2), nevertheless in some cases a diffusion towards Crete is found (D.5.3) though not as the norm.

Conclusions

The picture that emerged from this research, albeit in an embryonic state, allowed us to propose a new approach to the problem. The reconstruction of the routes used in the diffusion of the marbles examined is the result of the integration of data of different nature and a large collection of bibliographic comparisons. However, the small number of known shipwrecks, combined with the scarce presence of archaeometric studies to confirm the origin of the various lithotypes, constitute significant limitations to the development of this research. Pending further discoveries or archaeometric confirmations, the analysis of other products within the same commercial circuits could help greatly. Although numerous doubts persist on the dynamics linked to the ownership and distribution of marble products (Pensabene 2015; Russel 2013a; Russel 2013b), the interest in what was intended exclusively for Rome, could be reconstructed in relation to the annonary system and to wider commercial dynamics (Gianfrotta 2015, p. 118-120).

In the reconstruction of these sections, the work of Arnaud (2005) on the ancient routes was decisive, integrated with the archaeological sources on the wrecks, making it possible to identify the routes most relevant to the diffusion of marble. Furthermore, the analysis of the distribution of both these and other products from neighboring areas has made it possible to provide a support framework to interpret this complex problem.

The reconstructed routes, resulting from this analysis, seem mainly conditioned by variables of a technical-commercial nature or of a meteorological and marine nature. Precisely these last characteristics seem to have had significant weight in the conditioning of these routes from one season and another. As highlighted in the recent work by Beresford (2013), although the period open to navigation was much wider than previously thought, it highlights the meteorological parameters of the Mediterranean basin during the year. There remains the age-old question of the substantial invariability of these conditions over the last millennia (Murray 1987), although it is possible that even less significant changes could have led to the choice of some paths over others. Based on the work so far, an analysis of the routes in the Mediterranean requires a careful review of the ancient navigational conditions that undoubtedly played a decisive role seasonally.

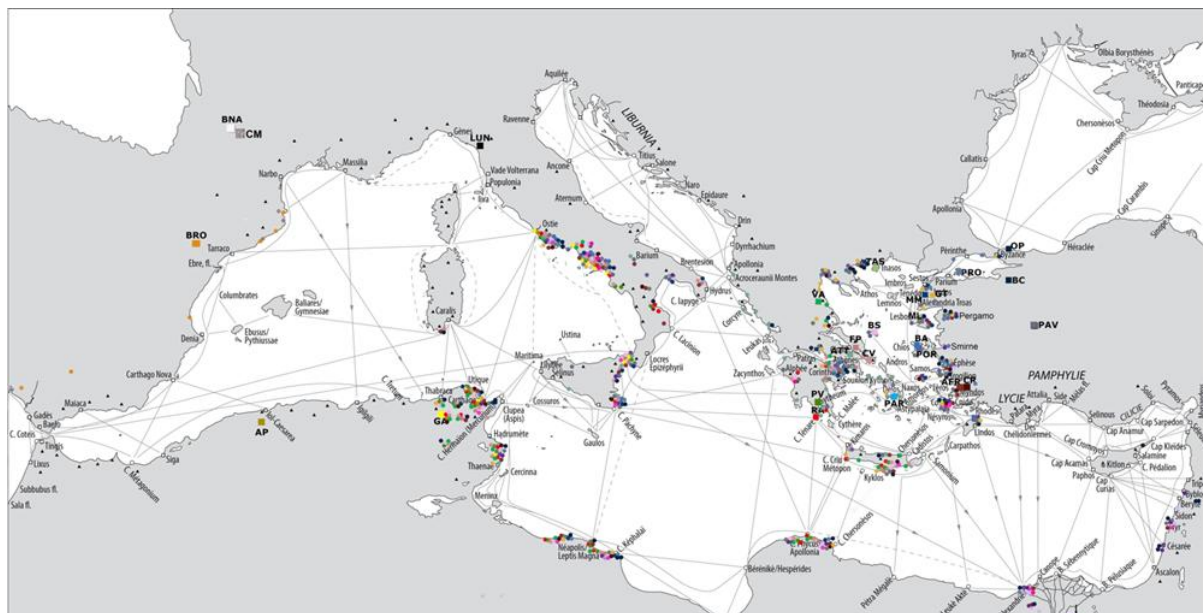


Fig. 3 - Map of the Mediterranean basin with indication of the main marine species mentioned in the text. (Reworked by G. Borriello from Arnaud 2005)

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