The Distribution of Troad Granite Columns as Evidence for Reconstructing the Management of Their Production

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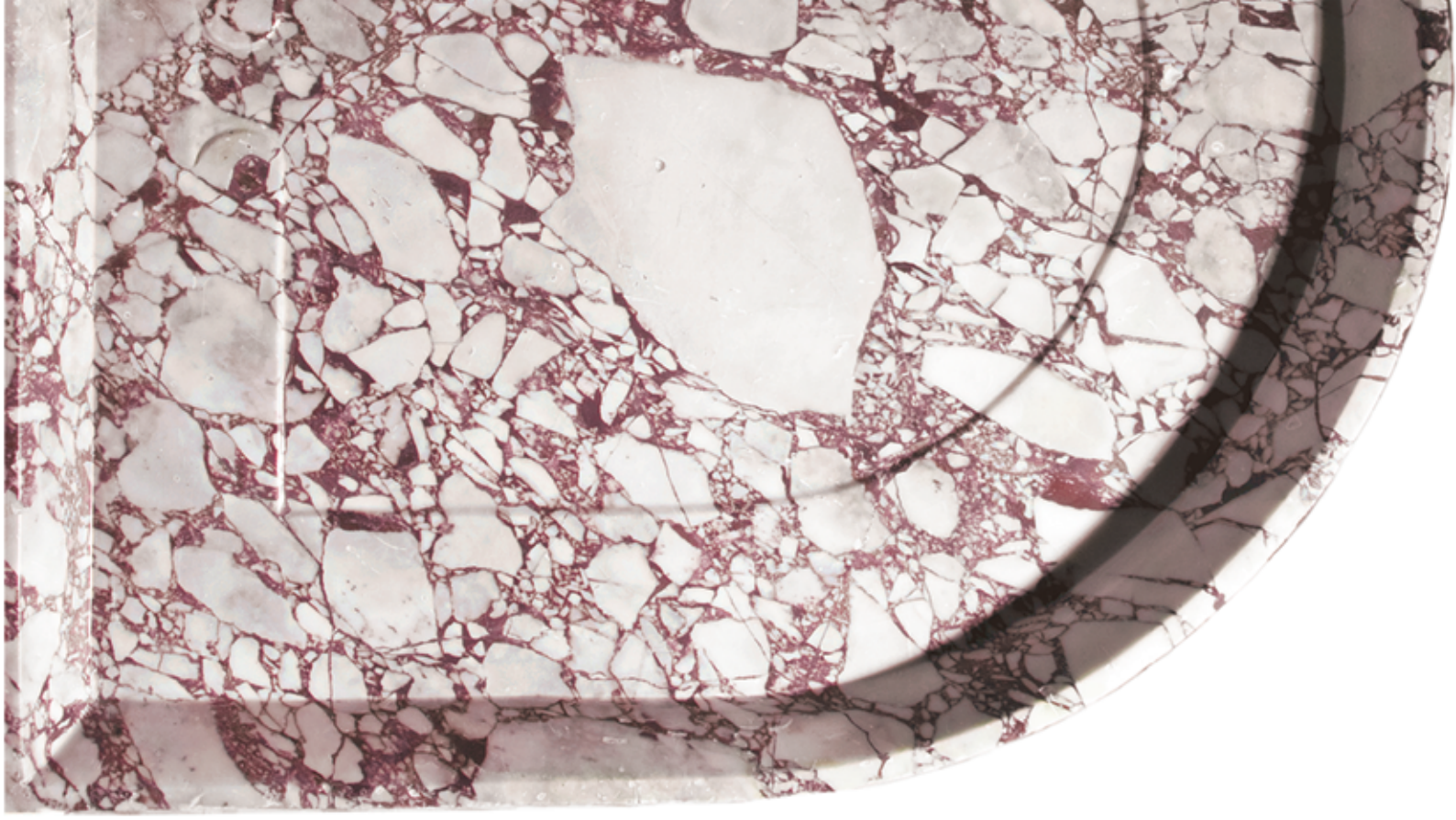

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CONTENT

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THE DISTRIBUTION OF TROAD GRANITE COLUMNS AS EVIDENCE FOR RECONSTRUCTING THE MANAGEMENT OF THEIR PRODUCTION

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Abstract

Based on an analysis of the distribution of Troad granite shafts, as well as of who commissioned the construction projects in which they were used, we analyse the organisation of the work in the quarries where this granite was extracted and the mechanisms that explain its distribution. Troad granite was little used in Rome, but is frequently found in the provinces. In fact, it was probably used in place of *granito del Foro*, which was almost exclusively used in Rome. Moreover, the presence of Troad stone in the provinces allows us to presume that concessions and rental contracts were awarded to private citizens for the various quarry extraction sectors. At the same time, the existence in the quarries of sectors specialising in the production of colossal shafts –the district of Koçali for example– supports the hypothesis of state control of the production.

Keywords
Troad granite, shaft, quarry

Shafts made of Troad granite are found in many Mediterranean towns and cities, generally accompanied by capitals and bases of Proconnesus marble. This fact and the standard measurements seen in most of them (roughly 10, 12, 14, 16, 18, 20, 30 and 40 feet) attest the considerable productivity of the Troad quarries, the close relationship there must have been between the different marble-producing districts and, as a consequence, the complex organisation that would have been needed to ensure that the quarries and all the production processes were well run.

Here we wish to analyse the organisational aspect of the work in the Troad quarries, as well as the distribution and transportation mechanisms of the quarried blocks. The scarcity of information that could help us better understand these processes – for example we do not know of quarry marks on the shafts – forces us to draw conclusions based solely on the analysis of the distribution of the shafts in the Mediterranean basin and on who commissioned the buildings they were used in.

We have already looked at the distribution of Troad shafts in two earlier studies[1], which is why here we will only refer to those cases that can help our understanding of how the work was organised in these quarries.

Troad granite in Rome

In Rome, Troad granite is found mainly in small- and medium-sized shafts that have been reused in the interiors of churches and other monuments (Tab. 1),

1 RODÀ, PENSABENE, DOMINGO 2012, 210-227; PENSABENE, RODÀ, DOMINGO 2015, 311-322. To the catalogue of shafts presented in these studies we can now add new examples, including two shafts currently preserved some 40 km north of Paris in the abbey of Chaalis, which was founded by Louis VI in the 12th century in Fontaine-Chaalis (Ermenonville); a reused shaft in an 18th-century gate in Soissons and another in the western portal of the abbey church of Saint-Remi in Reims. We would like to thank Annie and Philippe Le Blanc for this information. Another example is reused in the Sant Miquel funerary monument (Terrassa, Barcelona) (GARCIA, MORO, TUSET 2009, 128). We would like to thank Hernando Royo for this information. Other examples are reused at the entrance of the church of Santa Sofia and the portico of the rotunda of the Church of Saint George, both in Thessaloniki and built in the s. XIII. Another shaft, with a preserved height of 2.60 m and a diameter of 52.8 cm, appears reused in the courtyard of the "Palau del Cambrer", built in the s. XIV next to the Cathedral of Tarragona. And, finally, two fragments of shafts (40-45 cm diameter) preserved in the courtyard of the sanctuary of the *Virgen de la Cinta* (Huelva, Spain). We would like to thank Juan Campos for this information.

Building	Position	Number of shafts
Coliseum	Late-period phase of the *summa cavea* portico	1
S. Paolo f.l.m.	Archaeological promenade	2
S. Clemente	Central nave of the lower church	2 (5D and 6D)
	Upper church	1 (3D)
S. Sisto Vecchio		2 (2D and 4D)
Ss. Giovanni e Paolo	12th-century portico	1
	Central nave	1 (6D)
S. Maria Maggiore	Atrium	1
S. Stefano Rotondo	Internal circle	5 (1I-3I, 5I and 22I)
	External circle	5 (1E-4E and 8E)
S. Agata dei Goti		7 (1D, 2S, 2D, 3S, 3D, 4D, 5S)
S. Anastasia		3 (1S, 1D, 6D)
S. Maria in Domnica		3 (5S, 6S, 7S)
Ss. Quattro Coronati	Central nave of the church of Pasquale II	3 (1S, 2S, 4S)
S. Nicola in Carcere		4
S. Crisogono		6 (3S, 3D, 8S, 8D, 10S, 10D)
S. Lorenzo f.l.m.	Portico of the convent	4
	Cloister	1
Ss. Bonifacio and Alessio	Cloister	3
Ss. Vincenzo e Anastasio at Tre Fontane	Romanesque portico	3
Villa Celimontana		1
Quirinal	Porta San Felice	1
Santi Apostoli	Entrance to the convent of the basilica	2
San Giovanni in Laterano	Prothyrum	1
	Quadriporticus	1
	Cloister	2
Santa Sabina	Narthex	4
S. Maria in Cosmedin		4
S. Gregorio al Celio	Central nave	11 (3S-8S, 3D-6D, 8D)
Galleria Doria Phamphili	Entrance	2
S. Lorenzo in Lucina	Portico	1
Palazzo Borghese	Entrance	2
	Courtyard	10
Palazzo dei Conservatori	Courtyard	1
	Museum	2
Palazzo della Cancelleria	Courtyard	7
Palazzo Farnese	Vestibule	2
S. Giovanni a Porta Latina	Portico	1
S. Maria in Trastevere		1
S. Vitale	Portico	3
	Right external side	7

Table 1. Troad granite shafts reused in Rome (Font: LAZZARINI 1987, 162; PENSABENE 2003, 167-168; PENSABENE 2015).

Fig. 1. Port of Alexandria in Troad

whereas their presence in imperially-commissioned buildings is scant and concentrated in those from the Severan period. In this respect we can mention a fragment of shaft belonging to the restoration of the stage in the theatre of Pompey. Its diameter is 1.10 m, which allows us to estimate its height at approximately 8.90 m, meaning therefore that it was part of the first order of the *scaenae frons*[2]. Other examples are the shafts from the outer area of the Baths of Caracalla, with a height of some 20 feet[3], and the reconstruction of the portico of Octavia, restored with reused material following the fire of 191 AD, at the time when shafts of this stone were placed on the side porticos[4]. We can also add a fragment of a shaft deposited in the lapidarium of the Circus Maximus. Prior to that, from the Severan period on, Troad granite is documented in the area around Rome, including in the Piazza d'Oro in the Villa Adriana and the Forum in Ostia. In the northern half of the portico of this forum, which was probably financed by the *colonia*[5], a single fragment of Troad granite shaft with a diameter of 49 cm[6] is preserved (the rest of the preserved shafts belong to other varieties of granite or other types of stone). In the southern half, corresponding to the eastern side of the temple of Roma and Augustus, there are 11 fragmented granite shafts, of which at least four can be identified as from Troad, one of them being preserved almost whole (lower diameter 60 cm, upper diameter 51 cm)[7]. The variety of stone types from which the portico columns in this forum were made is due to the fact that in Ostia they frequently used shafts from the warehouses in Porto that were either surplus or were stored there waiting to be used. Therefore the use of one kind or the other depended on the number and type they had in stock at a particular time.

The most frequent use of Troad granite in Rome can be seen in the Severan period, coinciding with the decrease in the production of *granito del Foro* shafts. The last epigraphic evidence of activity in the quarries of *Mons Claudianus* is an *ostracon* with a dedication from the *Cohors II Ituraeorum* that can be dated to 222-235 AD[8]. The stone from these quarries was still used in the

2 DE NUCCIO, PENSABENE 2012, 53; MONTERROSO 2010, 143-146.

3 PEACOCK *et al.* 1994; PENSABENE 2013, 240.

4 BRUNO, ATTANASIO 2008, 53-54.

5 PENSABENE, BRUNO 1998, 296-299.

6 PENSABENE 2007, 260, nº. 2. The shafts were made from other types of granite including *bigio venato di Lesbo* and Hipona.

7 PENSABENE 2004, 265.

8 Also found in the area were some coins of Aurelian (269/70-275) and Probus (276-282 AD), PEACOCK *et al.* 1994, 229.

Fig. 2. Shaft of the baths of Antoninus in Carthage

Fig. 3. Shaft of the baths of Antoninus in Carthage

Baths of Caracalla[9] and the Severan reconstruction of the theatre of Teano, an imperial commission[10]. This also coincides with a decrease in the production of coloured marble shafts from the imperial quarries of Asia Minor and Greece[11] and an increase in the use of large Aswan granite shafts, such as the sixteen-metre-high examples in the hall of worship in the *Forum Pacis*, which was restored after the fire of Commodus.

The use of Troad granite in Rome may have also been furthered by the fact that in the Severan period shafts made with this material had accumulated in the port warehouses of Alexandria Troas[12] (Fig. 1) and Porto. The build-up of a large number of Troad shafts in the warehouses is demonstrated by the fact that, in their late-period use, builders frequently used shafts that had never before been seen in any building, for example, in Diocletian's palace in Spalato or in Rome as late as the 6th century AD (the church of Santo Stefano Rotondo). Moreover, the existence of such warehouses is confirmed by the initials[13] on some of the granite shafts in the church of Santo Stefano Rotondo[14].

Troad granite in the provinces

In contrast to the situation documented in Rome, where it is not common, Troad granite is much more abundant in the provinces[15], generally in the form of small- and medium-sized shafts between 3 and 5 m in height. It was also used to make some of the colossal shafts used in complexes we can assume were imperial commissions, such as those of the Baths of Antoninus in Carthage (40 feet high) (Figs. 2-3), those of the *Traianeum* in Italica (30 feet high), the 45 examples in Tarraco (some 15 feet high)[16], the 11 examples in Astigi (Écija) with a reconstructed height of around 20 feet[17], or the 52 examples in Aquileia, twelve of them 20 feet high, attributed to the *scaenae frons* of the Roman theatre[18], and other provincial examples with similar measures previously published[19].

The presence of Troad granite in the provinces contrasts with the complete absence of *granito del Foro*. The latter we find almost exclusively used in the imperially-commissioned architecture of Rome[20], to such an extent that it has been hypothesised that this type of stone was not sold commercially, except for small blocks and quarrying remains or cutting rejects that were used to make plaques and pieces for *opera sectilia*[21]. The presence

9 DELAINE 1997, 33, 58, 263.

10 BESTE 2010, 119-135.

11 DE NUCCIO, PENSABENE 2012, 52-53.

12 FEUSER 2011, 256-273.

13 PENSABENE 2015, 273-282. The marks allow us to reconstruct the figure of the intermediary in the distribution of the columns during this period.

14 At least six of these columns in Troas granite have the immoscapo and summoscapo unworked. They had obviously been taken from a store to add to those reused from other buildings to make up the number needed, BRANDENBURG 2009, 143-202; PENSABENE 2015, 240, Note 303.

15 RODÀ, PENSABENE, DOMINGO 2012, 210-227; PENSABENE, RODÀ, DOMINGO 2015, 311-322.

16 RODÀ, PENSABENE, DOMINGO 2012, 210-213.

17 FELIPE 2008, 117-128; FELIPE, MÁRQUEZ 2014, 170.

18 PENSABENE 2006, 365-421; PENSABENE 2010, 582-644.

19 RODÀ, PENSABENE, DOMINGO 2012, 210-227; PENSABENE, RODÀ, DOMINGO 2015, 311-322.

20 PEACOCK *et al.* 1994, 229; PEACOCK, MAXFIELD 1997, 334.

21 FANT 1993, 159; CORCORAN, DELAINE 1994, 272; PENSABENE 2013, 233.

of Troad granite in the provinces and in constructions not commissioned by the imperial household can also be explained by its considerable resemblance to *granito del Foro*, for which it may have been a cheaper substitute. According to Diocletian's Edict, while the cost of *granito del Foro* would have been 100 denarii per cubic foot, that from Troad, if it can be identified with the Anacasteno, perhaps because it is the only granite/marble of great diffusion not quoted in the Diocletian's Edict, would only have cost 40 denarii[22], the same price as Proconnesus stone, which had a similar distribution.

An example of a possible use of this granite as a substitute for *granito del Foro* is found in the large *rotae* (203-208 cm in diameter) that probably came from the floor of the Hall of Worship in the Provincial Forum of Tarraco[23] or, even better, from the floor of the temple of Augustus that, thanks to the *Historia Augusta* we know was restored by Hadrian (*Hadr.* 12, 3). These pieces remind us of the *rotae,* also made with other coloured marbles, in the floor of the exedra in Trajan's Forum (1.89-2.35 m in diameter); in the southern portico of Caesar's Forum (2.4 m in diameter); in the temple of Venus and Roma (2.4 m in diameter); in the Pantheon (1.95-2.44 m in diameter); and finally in the Severan-period floor of the Hall of Worship in the *Forum Pacis* (2.54 m in diameter), in *granito del Foro*, *pavonazzetto* and porphyry[24]. This last complex is structurally very similar to the Provincial Forum of Tarraco.

This theory of the use of Troad granite as a substitute is strengthened by its presence in the provinces, also in colossal columns, such as those we have already mentioned in the Baths of Antoninus in Carthage and the *Traianeum* in Italica. Meanwhile, in Rome other types of granite were used for columns of this size; for example, the colossal grey granite shafts were made exclusively of *granito del Foro*. We can mention the 50-feet-high shafts in Trajan's Forum that, judging by their size, would have belonged to the temple of Divus Ulpius, which must have been in the area of those shafts, as well as the 30-feet-high shafts of the basilica[25]; seven of the eight frontal shafts of the Pantheon, which are 40 feet high[26]; the more than 70 shafts with a height of just under 8 m in the large portico around the temple of Venus and Roma[27]; several shafts from the Baths of Caracalla with a height of 40 feet [28], two shafts found abandoned in the quarry with a height of 60 feet, perhaps destined for the temple of Serapis that Aurelianus built in Rome[29]; and finally, some examples in the Baths of Diocletian[30]. Other colossal columns in Rome were made of different types of stone, such as Aswan granite, which is found in the Severan phase of the Hall of Worship in the *Forum Pacis*, with 16-metre-high (14.85 feet) shafts; the Proconnesus marble found in the shafts of the temple of Venus and Roma, with 17.76-metre-high columns, or the cipollino marble in the shafts of the Temple of Antoninus and Faustina, with a height of 11.80 m. In Rome, only in very rare cases during the Severan period was Troad granite used to make large shafts.

The Troad granite distribution system

From these data the production and distribution system for Troad granite can be better understood. As far as the shafts found in the provinces are concerned, we have to consider in most cases local and/or provincial commission, while for those in the public architecture of Rome (very few), exclusively imperial commission.

On the other hand, we know that there were many quarries in the large district of Troad; a certain number of shafts have been restored for each of them, which allows us to draw some conclusions. For example, in the district of the zone of Koçali at least twenty 40-foot-high shafts are preserved[31], similar therefore to an example still preserved in the port warehouses of Alexandria Troas[32] and those at the Baths of Antoninus in Carthage financed by Antoninus Pius.

If we take as a basis the presupposition that the Troad granite quarries did not have a diverse administration, such as that of the mines or other quarries, we have to suppose in the first place that during periods of maximum demand the shafts would have been produced in all the sectors of the quarries. Secondly, due to such a large production destined for export, the work in the quarries would probably have been organised through concessions (*redemptiones*) and rentals (*locationes*) of the various sectors. However, it remains to be clarified

22 Barresi and Lazzarini calculate a cost of 75-100 denarii for that from Troas (BARRESI 2003, 168-169; LAZZARINI 2010, 488), but this is very close to the cost of *granito del Foro* (BARRESI 2003, 168-169; GIACCHERO 1974; *Edictum of Pretiis,* XXXI). However, the fact that Troad granite was so widely used in the provinces leads us to believe that its cost would have been considerably less.

23 RODÀ, PENSABENE, DOMINGO 2012, 213.

24 FOGAGNOLO 2007, 267-278; MENEGHINI 2009, 84.

25 PENSABENE 2013, 232, 238.

26 WILSON JONES 2000, 190-212, 220.

27 PENSABENE 2013, 246.

28 DELAINE 1997, 33, 58, 263.

29 PEACOCK, MAXFIELD 1997, 214.

30 PENSABENE 2013, 240.

31 PENSABENE 2013, 398.

32 PONTI 1995, 291-320.

what kind of entity was involved and over which more or less limited sector direct state control was exercised. In fact we have to consider that the production destined for Rome in the Severan period and the examples of Italica and Carthage presuppose imperial involvement, perhaps together with the town itself. Moreover, the probable presence of a district specialising in the production of colossal shafts, as Koçali appears to have been, probably presupposes state control of its production, given the need for specialised machinery to manoeuvre the huge, extremely heavy blocks of quarried stone that only state intervention could guarantee. In fact, under the system of concessions to private individuals of some sectors of the quarries it would have been difficult to coordinate the large specialised workforce needed to undertake a project of such magnitude and complexity[33].

On the other hand, the lack of imperial marks on the shafts or the blocks stored in the quarry and the role played by the port of Alexandria Troas in the warehousing and transportation of the shafts lead us also to consider the possibility that the quarry district was in the town's *ager publicus*, which would have awarded concessions for the different granite quarrying sectors. All this would have probably taken place under the control of the imperial administration, which no doubt reserved for itself the right to exploit directly part of the district for certain monuments or for specific periods of time.

The only information we have about conditions under which the quarries were exploited comes to us by way of a regulation in the Codex Theodosianus (*Cod. Theod*., 11.28.9): in the year 414 AD quarry workers were exempted from the payment of taxes, except those in the districts of Proconnesus, Troad and Docimium. From this law we deduce that the workers in these quarries were probably freedmen organised into specialist teams that took charge both of the extraction of the stone (*caesura*) and the initial squaring of the blocks, as well as of partially preparing the architectural and decorative elements (*officinae*). It is precisely the existence of a highly developed system of concessions that allows us to understand how they were able to meet such a high demand for architectural elements that were sent to their consignees via the trade routes and/or directly ordered by the towns and cities.

In summary, the fact that there is a lack of quarry inscriptions in the Troad quarries is another factor that indicates a production mainly carried out through concessions to private enterprises and freedmen. These would have paid a tithe or rent to the landowners[34], perhaps the town of Alexandria Troas. The businesses, on the other hand, would have handed over shafts to the imperial administration, at least in the periods established, to be sent to Rome and/or other localities where imperial euergetism was in play, even during the 2nd century AD.

Conclusions

As we have seen, Troad granite was used mainly in the provinces and for small- and medium-sized shafts. Only in a few cases, probably imperial commissions, was it used for colossal shafts: we recall the examples of the Baths of Antoninus in Carthage and the *Traianeum* in Italica.

This situation contrasted with that verified in Rome, where the use Troad granite for very large shafts appears to have been very limited and reserved for imperial projects from the Severan period on. We should not forget, however, the numerous small- and medium-sized shafts reused in some of Rome's churches, although we know that some of them came directly from warehouses and therefore had never been used before.

In fact, certain indications, such as the absence of quarry marks or a regulation in the Codex Theodosianus, appear to suggest that the exploitation of these quarries was managed by free enterprises, which would explain the wider distribution of the product in the provinces and in buildings not commissioned by the imperial administration. Nevertheless, the presence from the 2nd century AD on of colossal shafts made with this stone and destined for imperially-commissioned projects in the provinces also allows us to suppose that there would have been a certain amount of state control, at least in terms of those districts specialising in the production of large shafts, Koçali for example[35]. This state control would have allowed for the availability of the complex

33 PENSABENE, DOMINGO 2014, 119, 128-130. As an example we can mention the Las Médulas gold mines in the Tarraconense, owned by the state from 19 BC. It is very likely that the considerable size of these mines, the complex infrastructures needed for their exploitation, and the small amounts of gold they produced would have meant they were not profitable enough to justify and/or maintain a private exploitation system (DOMERGUE 1990, 303; 2008, 201-2).

34 To illustrate this fact we have the bronze tablets from the state-owned mines of Vipasca (Portugal). They refer to the payment of the *pars dimidia ad fiscum pertinens*, perhaps alluding to the payment of half of the metal mined, either in the form of metal or based on a tariff we are unaware of (DOMERGUE 1983, 124). Thus it seems that the amount paid directly in tax depended on the amount of metal mined. In other cases we know of, such as Las Médulas gold mines in the Tarraconense, the administration of the mines and the workers did not come under concessions, but directly under the state (DOMERGUE 1990, 303).

35 See n. 31.

mechanical and organisational system needed for the extraction and transport of the gigantic blocks.

However, these large shafts produced under state control were mainly destined for the provinces, while in Rome they used *granito del Foro*, a type of stone that was probably excluded from the normal trading circuits and controlled by the emperor. Only following the decrease in the extraction of *granito del Foro* and other coloured marbles from the quarries of Asia Minor and Greece does it appear that Troad granite began to be used in Rome in large imperial-type architectural projects. This coincided with an increase in the distribution of the large granite shafts from the quarries of Aswan.

Troad granite, therefore, can be considered as a replacement stone used mainly in the provinces in imitation of the growing tendency to use grey granites in the imperial architecture of Rome. While *granito del Foro* would have been almost exclusively used in grand imperial architecture, private, civic and provincial projects would have had access to Troad granite, which was very similar, but much cheaper.

Finally, it is likely that these types of stone –*granito del Foro* and Troad granite– had different distribution channels. While the large shafts of the former would have been shipped directly to Rome, probably following a well organised circuit, and would have been able to count on all the necessary machinery and specialists, the large shafts from Troad would have travelled by alternative trade routes to the main ports of the Mediterranean. There was, therefore, a specialisation in terms of the trade routes followed by each type of stone.

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