Tommaso Ismaelli and Giuseppe Scardozzi (editors), **Ancient Quarries and Building Sites in Asia Minor. Research on Hierapolis in Phrygia and other cities in South-Western Anatolia: archaeology, archaeometry, conservation.** Bibliotheca Archeologica, volume 45. Publisher Edipuglia, Bari 2016. 908 pages with 671 illustrations and 99 plates.

This weighty volume constitutes the main output of the Marmora Phrygiae Project, a three-year research project funded by the Italian Ministero dell'Istruzione, dell'Università e della Ricerca. The majority of the papers collected here are written by project team members, supplemented by contributions on wider topics presented at the Cave e cantieri antichi d'Asia Minore conference, held in Rome in 2015. The primary aim of the Project was to examine the quarrying, supply and use of marble in the specific context of ancient Hierapolis in Phrygia and to evaluate the logistical, aesthetic and economic concerns underpinning the exploitation of this material. The continued importance of this stone architecture and, in particular, methods for conserving it, were also explored. The data from Hierapolis were then considered alongside, and in relation to, new work emerging from other cities in Asia Minor. The emphasis throughout is on the highly specific local contexts in which this architecture emerged. In this sense, this volume very much follows the trend in recent ›marble studies‹, in which the interplay between highly localised patterns of stone-use throughout the Roman provinces and the better-understood interregional marble trade – much of it driven by imperial demand – is receiving considerably more attention. In this process, the well-preserved, marble-rich cities of Asia Minor have a key role to play.

This volume consists of seven chapters. The first, an extended introduction, presents the Project, its aims and results. The campaign of stone sampling, both within the quarries of Hierapolis and its buildings, which forms the basis of much that follows is presented by Giuseppe Scardozzi (1.1), one of the Project's coordinators. The context of the Project within wider scholarship on Asia Minor is then explained (1.2 – Francesco D'Andria). Detailed presentations of the online platform that emerged from the project (1.3 – Giacomo Di Giacomo) and the various computational techniques used on the project (1.4 – Massimo Limoncelli) follow. The extensive use of photogrammetry – employing Agisoft's PhotoScan – is reflective of a development apparent on most of the large-scale excavation projects working in Turkey, and indeed elsewhere around the Mediterranean. Here the results are impressive, in particular the way the resulting models are used as the basis for 3D virtual reconstructions of a series of the city's key buildings. Volumetric calculations of the Marble Stoa, derived from these models, are employed later in the volume in a discussion of labour requirements and construction techniques (4.12).

The second chapter, which acts as a prologue to the third, examines the geological setting of (a) the wider Denizli basin and (b) Hierapolis itself. The distinctive tectonic characteristics of the Denizli basin comprise the main topic of Pier Matteo Barone's paper (2.1); this is a region prone to earthquakes and many of the ancient structures of the city bear the scars of seismically induced damage. The very distinctive hyper-local geology of the Hierapolis-Karahayıt terrace is then considered by Stefano Marabini (2.2). The extremely fragmented geology of this area meant that its ancient residents had easy access to abundant outcrops of marble, travertine, as well as a range of clastic and carbonate rocks suitable for everyday building. Chapter three examines how these resources were exploited. The first contribution here, by Immacolata Ditaranto (3.1), concentrates on just the marble quarries. Four areas were quarried for marble in the territory of Hierapolis, two adjacent to the city (Gök Dere and Marmar Tepe) and two further afield, including those at the well-known site of Thiounta and from near Gölemezli. Calculations of the volume of the marble quarries close to the city suggest that around thirty thousand cubic metres were extracted from them in antiquity; in form and distribution they are comparable to the ›City Quarries‹ at nearby Aphrodisias, though these are significantly larger in scale. Higher quality marble, which inscriptions show was used for sarcophagi at Hierapolis, came from Thiounta, twenty kilometres north of the city. The fact that marble was also extracted near Gölemezli, thirteen kilometres north, an area more famous for its alabaster quarries, shows the extent to which the whole territory of Hierapolis was prospected for suitable marble sources. Matteo Brilli and colleagues present the results of their archaeometrical characterization of the marble of these quarries (3.2). Tamer Koralay analyses a further quarry at Yenişehir, south-west of Denizli (3.3) and together this new suite of samples provides a fine-grained picture of regional marble types for the first time. As Matteo Brillim and others note, distinguishing this material from other white marbles used in Asia Minor still remains challenging, but at least locally such investigations can highlight important trends in sourcing and extraction. As Scardozzi observes, in his summary of this discussion (3.4), these marbles can be distinguished from Aphrodisian. This same author then turns to the material for which Hierapolis is famous: alabaster – or, strictly speaking, banded travertine (3.5). This white, brown and red stone, conventionally described as either ›listato‹ or ›fiorito‹ depending on whether it is cut with or across the grain, is the only regional stone that was widely exported. The detailed survey of the territory that Scardozzi presents here shows that the quarrying of alabaster took place all across the northern portion of Hierapolitan territory; over forty thousand cubic metres were quarried, often via long trenches. The final lithotype considered in this section

is a polychrome breccia, which Emma Cantisani and Scardozzi (3.6) demonstrate was quarried just north of the city. This reddish stone was used for column shafts in the city in much the same way that imported polychrome stones were in other, typically coastal, cities.

The contributions in the fourth chapter turn from the quarries to the buildings in which these various stones were used. The archaeometric analysis underpinning the identification of the stones used in the key buildings of the city is first provided (4.1), which shows that the city drew extensively on all of its resources in most periods. Scardozzi then turns to the sarcophagi (4.2) and the conclusions drawn are interesting. A series of garland sarcophagi that are traditionally attributed to Aphrodisian carvers on stylistic grounds were also shown to be carved in Hierapolitan marble. Locally produced were also a version of columnar sarcophagi similar to the more famous types from Dokimeian, examples of which were also imported to Hierapolis. A specific study of the sarcophagi from the church of St. Philip follows (4.3). Here Sven Ahrens and colleagues are able to show both that a higher number of imports made their way into this specific context and provide further examples of locally produced Dokimeian-style products. In what follows, individual buildings are considered from the perspective of stone-use and supply. Close analysis of the North Agora by Ismaelli and Scardozzi (4.4) shows the efforts that the builders had to go to in order to secure sufficient supplies, with marble from Gök Dere being used for the North, West and South stoas, but all available sources of marble being exploited for the colossal Stoa-Basilica. Detailed studies that consider similar questions, while also engaging with stylistic analysis of the architectural decoration, then follow on the Nymphaeum of the Tritons (4.5 – Lorenzo Campagna), the Theatre (4.6 – Ismaelli, Scardozzi and Giorgio Sobrà), the Sanctuary of Apollo (4.7 and 4.8 – Ismaelli), the Ploutonion (4.9 – D'Andria, Ismaelli and Scardozzi; 4.10 – Sara Bozza), the Marble Stoa and Gymnasium (4.11 – Ismaelli; 4.12 – Dominik Maschek), and the Stoa of the Springs (4.13 – Ilaria Miccoli). While all of these contributions provide vital new assessments of the monuments in question and are all extremely well illustrated, two stand out for adopting innovative methodologies. Ismaelli's detailed analysis of the construction techniques and architectural decoration of the Severan Temple A in the Sanctuary of Apollo (4.8) is especially worthy of note. In this study, the author distinguishes between the hands of different carvers and reconstructs how they worked together on the ornamentation of this building. Quality played a role in their distribution, with the best workers seemingly employed on the most prominent parts of the building. Maschek's study of the Marble Stoa (4.12), unlike most studies in the volume, focuses squarely on the question of labour, employing constants from Pegoretti and considering the labour involved in the transport of materials. Maschek estimates that the family who paid for the stoa must have contributed at least 310.000 sesterces, providing an important boost to the local building trade; when such numbers are scaled up for other projects the socio-economic significance of building activity becomes clear. A key point that emerges from this study and many others in this section is the apparent dominance of local craftspeople and local traditions of stone-working, albeit shaped and influenced by regional practices, in the building industry of Hierapolis; in the main these individuals were also working in local stones. While the influence of nearby centres of marble-working, like Aphrodisias and Dokimeian, on the architecture of the city has probably been overstated, certain features of the structures examined certainly owe their design to external sources, be they Aphrodisian or Pamphylian, as Ismaelli suggests for elements of Temple A.

Four contributions with a broader focus round off this fourth chapter. First, Ismaelli and Scardozzi (4.14) present the identification of marbles from the Civil Agora, Tomba Bella, Dodekatheon, North Theatre, Macellum, and Bouleuterion. Scardozzi then provides an overview of the system of marble supply for building, noting how the different sources were used over time (4.15). Ismaelli and Bozza (4.16) turn to the practicalities of building, highlighting how procurement strategies varied by project, the evidence for repairs and restorations of buildings, and the use of metal in the architecture of the city. The final contribution in this chapter, and one, which arguable belongs elsewhere in the volume, is Fabio Fortinguerra consideration of the ownership and management of the quarries (4.17). This is a useful summary of recent scholarship on this topic, which quite sensibly proposes that the Hierapolitan quarries were owned by private individuals or operated by the city authorities, or perhaps a combination of the two.

A shorter fifth chapter considers the specific case of the church of St. Philip, one of the most important late antique buildings at Hierapolis. Maria Piera Caggia considers the construction phases of this building and examines the design of, and materials used in, its opus sectile floor (5.1). Manuela De Giorgi (5.2) follows with a study of the architectural elements, which are the best evidence for Byzantine-era carving at the site, the broader evidence for which is presented in the succeeding paper by Silvia Pedone (5.3). The two final contributions in the chapter move away from stone to examine, in turn, the mortars and plaster

(5.4 – Cantisani et al. and the painted plaster (5.5 – Cantisani et al.) from the church.

Chapter six moves away from buildings to consider specific artefacts, as well as to discuss the preservation and conservation of marble monuments at the site today. The first study in this chapter, on cathodoluminescence, would have been better placed in the third or fourth chapter, even though its authors provide a useful test study of the application of this technique to marble (6.1). The general conservation strategy at Hierapolis is presented fully by Cantisani and colleagues (6.2), while a more focused study by Silvia Vettori and others explores techniques for monitoring surface degradation of the monuments (6.3); a third contribution, on lichens and their biodiversity, falls under the general heading of conservation (6.6 – Oana Adriana Cuzman et al.). A second category of papers in this chapter explores how modern imaging techniques can be used to further understand the site. These include papers by Di Giacomo and colleagues on thermographic imaging for identifying seismic fissures (6.8), the results of geophysical survey at the site (6.9 – Giovanni Leucci et al.), and optical high-resolution satellite imagery for identifying quarries (6.10 – Barone and Scardozzi). The remaining papers in this section include useful studies of sculptural polychromy (6.4 – Susanna Bracci and Marco Galli), mortars at Hierapolis (6.5 – Cantisani et al.), and binders used in ancient restorations (6.7 – Cantisani et al.).

The final chapter aims to place Hierapolis back into its wider regional context. Eleven papers present comparative evidence from other sites, local (Laodikeia on the Lykos and Aphrodisias) and further afield (Nysa, Ephesos, Teos and Labraunda), and explore the pattern of quarrying in the region more generally, the funding of building projects, and the regional architectural identity of Asia Minor. A survey of recent publications on quarrying in Asia Minor by Patrizio Pensabene opens this section (7.1). This is followed by a discussion of recent work on quarrying in the territory of Aphrodisias by Lea Emilia Long (7.2). Since Aphrodisias has long been known as a centre of the marble industry in Asia Minor and much of the discussion of Hierapolitan architectures that dominates this volume makes frequent references to the city, this is a pertinent contribution. These regional quarries complemented the closer ›City Quarries‹, providing a range of grey and mottled materials that architects in the city juxtaposed with the prevalent white. Papers on Ephesos (7.3 – Georg Plattner; 7.8 – Tekla Schulz-Brize), Laodikeia on the Lykos (7.4 – Celal Şimşek), Nysa and Teos (7.5 – Musa Kadıoğlu), and Labraunda (7.9 – Agneta Freccero) show that the picture that emerges in detail from Hierapolis is not unusual. Most cities in Asia Minor relied for the bulk of their stone needs on local or regional sources; this is true of ordinary building stone but also of decorative, white and polychrome, materials. Imports, when they are found, are used in a highly targeted manner to showcase them to best effect. Crucially, as Ursula Quatember argues in her section (7.6) on the ›regional identity‹ of Roman architecture in Asia Minor, most architects in this region could draw on local sources of high-quality marble and the expertise in working with it, which was not true of manner in other areas of the empire. Following up on this point, Anne-Valerie Pont (7.7) turns to the commissioners of these buildings, focusing in particular on the relatively limited evidence for direct imperial involvement in construction in Asia Minor; in much the same way as the burden for supplying these projects fell on the local territories, so the burden for their financing fell on local elites, often groups of them. Two final papers in this section should probably have been placed elsewhere. Mauro Matteini's paper on marble and limestone conservation could have been better placed alongside the earlier papers on conservation at Hierapolis, even if it does not consider that city (7.8). Grazia Semeraro's discussion of the Sanctuary of Apollo at Hierapolis (7.10) could also have been set alongside the other discussions of this complex, since it deals with the evolving history of the space in the first three centuries A. D.

This volume provides the single most detailed study of stone-use within a particular Roman urban centre ever undertaken. Most of the contributions are both well written and illustrated. The fine-grained picture of local resource exploitation and of the channelling of these materials into building projects is very impressive. The best papers focus on local and regional quarrying and the ancient buildings of Hierapolis itself. It would have been useful to hear more about the sarcophagi and the statuary, which were only touched on in a couple of sections. There is also occasional repetition between papers and it is unclear whether it was really necessary to print all the contributions collected; some of the chapters are overly descriptive reports, and might have been better published on a project website. The repetition in part emerges from the complicated structure of the volume, which attempts to break into sections a mass of material that is not easily subdivided. The volume also tries to bring together two sets of papers, one produced as part of the Project, the second emerging from the Cave e cantieri antichi d'Asia Minore conference; the editors have kept these papers in separate sections but integration might have been preferable. These are relatively minor issues, however. Anyone interested in Roman stone trade, Roman architecture, urbanism in Asia Minor or ancient

building conservation will find much of interest here. The project coordinators and editors have pulled off quite a feat to collect and publish all of this material in just over three years and they are to be commended for their efforts.

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