Building stones used in the construction of Stratonikeia and Lagina ancient cities (Muğla, SW Turkey)

Abstract

SW Turkey was called as the area of Caria in the archaic ages. This region hosts many ancient cities Stratonikeia and Lagina (Yatagan, Mugla), Idyma (Ula, Muğla), Kaunos (Ottaca-Dalaman, Muğla), Labranda (Milaş, Muğla), and Gerga (Çine, Aydıncık) etc. Among these cities, Stratonikeia, Lagina come forward due to known as a gladiator’s city and first pagan city in the world. Stratonikeia also includes the subsequent civilisations traces such as Romans, Byzantium, Seljuk State, Period of Emires, Ottoman Empires and Turkish Republic. The remnants of these civilisations highly affected by the natural process such as sedimentation and earthquakes. During the reconstruction of these structures using an original building stone are highly important. Within this context, stones of Lagina and Stratonikeia are specified by visual inspections and their origins were compared with recent marble catalogues. White-purple-lilac-black coloured marbles were widely used for the construction of the base, side walls, pillars, seats of the amphitheatre, gymnasia, assembly and road and gate of both cities can be found in recent marble catalogues under the different trade mark. They can be easily supplied close marble quarries. Phyllite-schist-gneiss are metamorphic rocks that widely used at the on the base and side walls, crop out in northern part of the cities. Travertines were limitedly used in pillar and side walls of the Lagina ancient city. Travertine also has limited exposure surroundings of the Muğla.

Introduction

Turkey is home to many ancient cities from different eras and civilizations. Their restoration and conservation is of great importance both in terms of cultural tourism and their transfer to the future generations in good condition. Restorations performed by unqualified people and the use of inappropriate building stones lead to unacceptable results, which are sometimes reflected in the press. Therefore, it is important to determine the characteristics of the building stones used in the ancient cities and to reveal where they can be obtained from. In the Archaic periods, Mugla and its surroundings (Figure 1) are known as Caria. This region is home to many ancient cities such as Stratonikeia (Yatagan), Lagina (Yatagan), Idyma (Ula-Akyaka), Kaunos (Koycegiz), Telmessos (Fethiye), Labranda (Milaş), Euromos (Milaş), Iasos (Milaş), Keramos (Ören) and Halicarnassus (Bodrum). Stratonikeia and Lagina, located in Yatagan, are of particular importance among the other ancient cities due to their locations and various features. In the construction of these cities, both Mugla and nearby Western Anatolia resources were utilized.1-3 In this article, different building stones, which are visually identified in the ancient cities of Stratonikeia and Lagina, are compared with the units known in the region’s geology and the marble catalogues of Mugla Marble Association (Figures 1–3). Final results require chemical analysis on both the ancient city and the local quarry samples, and identification and comparison of various engineering parameters.

Ancient cities, Stratonikeia and Lagina

Stratonikeia is an ancient city spread over a large area on the Yatagan-Milas highway before reaching the village of Eskihisar. Archaeological excavations were initiated by Prof. Dr. Yusuf Boysal in 1977 in the city, which is also known as the city of Gladators, and today, these are conducted by Prof. Dr. Bilal Sögüt from Pamukkale University Faculty of Archeology (http://stratonikeia.pau.edu.tr/: access date: 01.09.2019). The city, where settlement has existed since the Hellenistic period, came to the forefront and its name was changed as Stratonikeia in 281 BC during the reign of Seleucus King Antiochus I. Later, the city was used as settlement area during the Seleucids, Ptolemas, Macedonians, Rhodes, Roman, Byzantine, Seljuk, Ottoman periods and it is being used as settlement area today.5-6 Lagina is located in Yatagan District in Turgut Town. The first archaeological excavations in the region were carried out by Osman Hamdi Bey between 1891-1892 (http://lagina.pau.edu.tr/index4.html). In the following periods, the excavations were conducted by Prof. Dr. Yusuf Boysal between 1967-1970, and by Prof. Dr. Ahmet Turpan and Prof. Dr. Bilal Sögüt after 1993 (http://lagina.pau.edu.tr/index4.html). In the area of the ancient city of Lagina, there are important buildings such as the Propylon Gate, the Stoa-sanctuary, the Temple of Hecate, the Altar, the Houses of the Priest’s and the Chapel.5,6,7,13 http://lagina.pau.edu.tr/index4.html: access date 2.09.2019) Although the article of Russell and Walkens de Paepe and Moens cited by him indicate that, local marbles were used in the construction of the city of Stratonikeia, a specific location or type of marble is mentioned.
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Figure 1 (A) Location map of the study area. (B) General geology map of the Muğla and surrounding region (modified after Candan and Dora, Yavuz et al., Gül).

It was found during the field observations that, the blocks used on the walls and in the construction of floor structures of areas such as Gymnasium-Sports School, Bouleuterion-Parliament building, Columnar Street, Amphitheatre, Temple and the Water structure in the city of Stratonikeia; and the blocks used in the construction of the walls, floor and column structures of Propylon, Stoa and Hecate Temple in the city of Lagina, were mostly white, thin-medium crystalized marbles (Figure 2). In the catalogues, this marble is known as ‘Caria White’ or ‘Muğla White’. Some of the white marble blocks were observed to be patterned. When examined carefully, it is understood that, the texture extracted from the same quarries and the marbles called ‘Newyork marble’, ‘Azuro’, ‘Bianco Ibiza’ are also used in the catalogue by the operator (Figure 3). This Mesozoic aged marble is already being operated in the quarries located in the west of Stratonikeia, and in Yatağan and Kavaklıdere (Figure 1B).
Apart from the marble type mentioned above, other types of marble used in smaller amounts were also found in the field studies. Although the weathered, karstic cavernous, breccia marbles observed in the Columnar Street of Stratonikeia are yellowish white or creamy white, these were considered as white marble. This type of marble is found in the sections cut by the faults in the marble quarries, in the fault breccia zone developed due to the fault movement, and the excess water activity in this weakness zones caused the formation of yellowish off-white colour. In the city of Stratonikeia, it was observed that several columns and marble blocks were purple coloured veined marble. This marble is the marble type called ‘Milas Lilac’ and ‘Milas Eggplant’ in the catalogues (Figure 3D). In addition, though in a small number, some of the large blocks in the Lagina-Altar structure and on the walls of the Propylon-Entrance gate, in the Stratonikeia temple are black coloured veined marble blocks. This type of marble is black Triassic aged marble, and known as ‘Karaöz-Black-Ayhan Black marble’ (Figure 3E). Besides the marble pieces mentioned above, maroon-coloured marble pieces, which are extracted from the quarries around Kalnağil-Milas and known as Ege Maroon-Milas Maroon are encountered in the mosaics found on the floor of the northern entrance gate of Stratonikeia (Figures 1B, 2D & 3F).

The various aged and coloured marble quarries were distributed all around the Muğla, and they can supply big blocks suitable for the large sized construction materials (Figure 1B). They can also easily have carved for small-scale structures. Thus different marble blocks should
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Conflicts of interest

Author declares that there is no conflict of interest.

References


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Conclusion

As a result of visual inspection, both Stratonikeia and Laguna ancient cities were mainly constructed with using local geologic material. White marble, black-veined purple-white marble were mainly used for side wall-seats-pillar-gate and partial floor construction. Black marble and brecciated marble were used at a lower rate for side wall and pillar constructions. Travertine only used in some pillar and side wall of Laguna. Foliated metamorphic rocks including phyllite-schist-gneiss were generally used for the floor of the marble buildings for supplying a strong foundation. Nearly all geomaterials that used the Stratonikeia and Laguna construction were obtained from close geologic sources. If necessary, during the reconstruction, those materials can be evaluated after detail analytic and laboratory test.

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