Historical transformations of early medieval basilica churches of the North-Eastern Black Sea region in the light of the new data method based on lime mortars

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Abstract. The article is devoted to the study of the medieval temples’ architecture historical transformations in Musser, Tsandripsh, Loo in comparison with the data of the temples’ mortar analysis by the X-ray phase method. The scientific novelty of the article is due to the fact that a comprehensive study of historical transformations and volumetric-spatial solutions of the temples made it possible to clarify their dating and construction periods.

Introduction

The relevance of this article is due to the lack of consensus today regarding the dating and construction periods of the temples presented in the article. The Mussera temple has repeatedly attracted the researchers’ attention. However, the assumptions differ significantly on its dating. So, L. D. Rcheulishvili calls the end of the VI-VII centuries. [6], I.V. Berdzenishvili - VII-VIII centuries, [1], E. Neubauer inclines to VIII-IX centuries [8], V.P. Pachulia dates the temple to the 9th – 12th centuries [5], A.Yu. Vinogradov and D.V. Beletsky called the date 970 [2]. Yu.N. Voronov refers the construction to the X-XI centuries [3], L.G. Khrushkova does not name the estimated date [9], V.V. Pishchulina and E.M. Kishkinova proposed the date of the construction beginning as the 6th century, the second construction period - the 10th century [4]. L.G. Khrushkova identified two construction stages in the course of archaeological excavations of the Tsandripshsky temple: the 6th century - the main structure and the 10th century – its western porch [7]. Temple in Loo based on the results of archaeological excavations by B.B. Ovchinnikova dates the X-XI centuries, noting, nevertheless, the features of an earlier structure in its western part - including the absence of a walled narthex [3].

The purpose of this article is to clarify the construction periods of the studied temples. The tasks are: to study the architectural features of the temples in Musser, Tsandripsh, Loo in comparison with the data of a new method of dating medieval objects using mortars [9].

Material and methods

All three temples are located on the Black Sea coast. Mussera Church is located in the Gudauta region of Abkhazia, on the territory of the Pitsunda-Mussera Biosphere Reserve, on the left bank of the Ambara River, which flows into the Black Sea.
Located on a hill, the Musser Temple was once located inside a fortress, the ruined walls of which can be seen around it. In plan, the temple is a rectangle measuring 22.5x18.6 m, elongated in the west-east direction. The entrance from the west is located almost in the center of the facade, with a slight offset to the north, and leads to the narthex. In the lower tier, the narthex has two window openings on the northern and southern sides. The embrasures of all windows of the monument are trapezoidal and widen inward. From the narthex, two openings lead to the central nave. It significantly surpasses the side walls in height and width and ends with an apse, semicircular in plan from the inside and not protruding beyond the outer walls in the exterior, cut through by one window. Wide aisles lead from the central nave to the side ones. On its longitudinal walls there are two pairs of pilasters, and in the eastern part, near the apse, one more pair of pilasters with ledges form asymmetrical "shoulders". The central apse is connected with the side rooms by narrow passages.

The side aisles contain two rooms and are not symmetrical. The northern nave is divided into a small room on the west, with one window, and a longer one on the east, with three windows, with the rooms connected to each other. The eastern room ends with an apse with a window, which has a drop-shaped outline in the plan, curved towards the central axis of the building. From this extension, a narrow corridor leads to a small room - a "pocket", which has a lenticular outline of an irregular oval shape. The apse of the north nave is connected with the central apse by a stepwise widening passage. The southern nave, on the other hand, is divided into a short section from the east and an extended section from the west, and they are not connected to each other. A short section, which has one window from the east, that is, in the apse, and from the south, is connected with the central apse by a step-expanding passage. A short corridor leads from it to a room between the apses, which has a shape close to a triangle in plan. The extended western section of the south nave, completed with an apse, opens onto the facade with three arched doorways. The placement of the entrance from the south is known to be typical for the Syrian tradition.

The temple above the Loo village has similar constructive composition peculiarities, it was examined in detail by B.B. Ovchinnikova [3]. A feature of the temple in Loo village is the presence of a pentahedral central apse with semicircular lateral ones. This combination is characteristic of numerous temples of this period in the Eastern provinces of Byzantium, for example, in the Crimea, Bulgaria and Trebizond, the basilicas of the Northern Black Sea coast of the 6th century (for example, the basilica in Tsandripsh), but in the cross-domed churches of the region, we see a similar reception only in the Anakopia church of Simon the Canaanite. The performed architectural and archaeological investigations made it possible to clarify the dimensions of the temple, facades and individual details of the building. The total length of the temple with pilasters and apses is 21 m, width: 12.25 m, thickness of the walls: 1.1 m. This is a three-nave, three-apse building elongated in length. Local features of the temple are the masonry originality of the walls with transverse white stone inserts forming pilasters, as well as the presence of sacred trees near the temple. Six pillars are symmetrically located in the center of the temple, only their bases have survived, the size of the dome square side is 3.5 m. The distance between the eastern and central pairs of pillars is equal to the width of the central nave (3.5 m), the pillars form a square in plan. This allowed B.B. Ovchinnikova to suggest that these supports were domed. However, no parts of the cross-domed system were found among the ruins of the temple.

The middle apse is somewhat elongated. Its floor is raised above the floor of the central nave by 0.30 m. The western part of the temple is separated from the prayer hall not by a wall, but by a pair of pillars. This feature distinguishes the temple in Loo from many religious buildings of the X-XI centuries, similar in composition and plan, in Chersonesos, Anakopia, Bzybi, Lykhny. There was no narthex, that is the similarity of this temple with the basilica temples of the early Middle Ages. The temple was illuminated by narrow (0.4 m) window openings with a wedge-shaped arched end made of lime slabs and shell rock slabs. From the outside, in the decoration of the temple walls, in a number of places, the remains of the facing have been preserved. Another feature of the temple is the dissection of the inner facades of the southern, northern and western walls by pilasters, which could turn into arched semicircles. A facing block with individual letters of the Greek alphabet was found [3, p. 14].
Tsandripshsky temple is located 17 km north-west of the Gagra city, on the territory of a large seaside village. Nearby, at the mouth of the Khashupsa River, the remains of an ancient fortification have been preserved, which are included in the new buildings’ composition. The monument is surrounded by the graves of a modern cemetery, which did not allow exploring the adjacent territory. In the Khashupsa gorge, 30 kilometers from the sea, on a high cliff, there are the ruins of a large fortress. It controlled the pass to the North Caucasus. The fortress has been little explored, according to the construction technique and analogies of L.G. Khrushkova was attributed it to the 6th century, which was confirmed by the results of the analysis of the solution by the X-ray phase method in 2020, performed by the authors of this article. Under the cover of this fortress, the Tsandripshsky temple existed. Tsandripshsky temple is also a three-aisled basilica with three protruding apses, a narthex and an adjoining small portico, which has been uncovered by excavations. Overall external dimensions 27.5x16.6 m (without the southern portico, which belongs to a later time). Very often in basilicas, the altar barrier was moved into the nave to increase the area of the altar. The situation was different in Tsandripsh, here the visitors from both the baptismal room and the memorial chapel could not move to the altar space, which was intended only for the clergy. They moved to the eastern part of the central nave, separated from the altar space by a fence. The area of the altar is increased due to the bema. There is no integral three-part altar space, united by doorways and intended for the liturgy of the Eucharist. These are the three isolated cells, with its own special functions each. There is no altar, no deacon. Tsandripsh materials confirm the opinion of many researchers, which emphasize the illegality of the name altar and deacon premises next to the altar in early Christian churches. The functions of these premises (we join the opinion of L.G. Khrushkova) may be different [9]. Basilica with its dynamic focus on the altar corresponded well with the early Christian “liturgy processions”. Even D. Krafut noted that the Palestinian and Syrian three-apse churches, built no later than the second quarter of the 6th century, are not associated with the new Constantinople liturgy. The Syrian origins of the liturgical space organization in Tsandripsh are reflected in other features. In Syria, a memorial chapel is often located in the southern room of a three-part sanctuary. A similar solution in Tsandripsh. The baptismal font in the apse is another characteristic Syrian feature.

Discussion
The dating of the Musser Temple is controversial. So, L. D. Rcheulishvili dated this monument to the turn of the 6th - 7th centuries and considered it earlier than the Kiach temple. A. Yu. Vinogradov and D. V. Beletsky, as well as L. G. Rcheulishvili, compare the composition of the western wall of the Myusser temple with the Lykhny temple and Kvelatsminda in Gurjaani, as well as with the Tsandripsh basilica, and the door at the organ loft level is attributed to the influence of the cathedral in Mokvi. Highlighting two stages in the construction history of the temple, these researchers date the monument to the X century [2, p. 153-155].

Comparing the Myusser temple with the temple in the village. Kondamiani (Georgia), dating back to the 7th century, it should be noted the similarity of the altar rooms separated by a wall, as well as the three-arch solution of the southern facade. Apparently, the Mussera narthex was added later, possibly in the 10th century, which explains the presence of a wall delimiting it from the main hall, and the “closed” organ lofts characteristic of the 10th century monuments. There is also a noticeable similarity in the nature of the masonry, as well as the design of the two churches’ facades - in Musser and Kondamiani. The reconstruction of the Mussera temple in the 10th century also affected its southern part - an apse appeared there in the southern gallery, which turned the temple into a three-church basilica. Such techniques for arranging the apse in the gallery, after the apse in the pastofoorium, are characteristic of the X century (for example, the temple in Nekresi), which allows us to conclude about the time of the building’s reconstruction [4].

The solutions’ analysis confirmed the estimated date of the construction beginning of the Mussera temple - VI century. The main facade, an altar inside and the remains of the ancient building from the north belong to this time. By the VII century the north wall and galleries had been completed. The assumption was also confirmed that in the X century the temple underwent reconstruction - the
western wall with the organ loft, the temple facing were altered. This explains the similarity of the western wall with the organ lofts with similar monuments of the 10th century, noted by the researchers who dated the temple to the 10th century. Outside, the altar was renovated in the 12th century. (Table 1).

Throughout its centuries-old life, the Tsandripsh Basilica underwent restructuring. The first reconstruction, which greatly changed the temple’s appearance, took place around the 8th-9th centuries. The most significant alterations were the elimination of the narthex with an adjoining portico and the construction of stone vaults instead of wooden floors above the first floors of the side naves and the central (except for the apse and bema). The vault of the central nave rested on new additional pillars attached to the original pillars, which in fact turned out to be pilasters, passing at the top into supporting arches. The thickness of the vault was 0.9 m, the main building material was well-fired rectangular bricks, tiles were used in backing. The foundations of the new pillars are only 0.6 m deep. Three pillars were installed on the tombs of the central nave. In connection with the vaults’ arrangement, the organ lofts in the side aisles were eliminated. The altar barrier was expanded and slightly shifted to the east. In the X-XI centuries, the appearance of the temple changed again. On the western side, at the entrance to the church, there was a vestibule-vestibule, resting on four corner pillars, and at the southern entrance - a small portico made of broken limestone. A new floor was made, with brick paving and a layer of loose lime concrete.

The solutions’ analysis of the Tsandriphsky temple confirmed the date of the beginning of its construction at the end of the 5th - beginning of the 6th century. The southern wall was completed by the 7th century. The porch, according to the analysis results, was added at the end of the 10th - beginning of the 11th centuries (Table 1).

| No. | Registration number | Location, object name | Sampling location | The intensity of the main peak of calcite crystallinity (ARLXTRA device) | Dated by the main peak intensity of calcite crystallinity, century ARLXTRA | Intensity of the main peak of calcite crystallinity (Dron device) | Dated by the main peak intensity of calcite crystallinity, century Drone | Common dating, century | Note |
|-----|---------------------|-----------------------|-------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------|-----|
| 1.  | EA-20-TS-1          | Tsandripsh            | pillar            | 5200                                            | 4800                                            | 5-6                                             | 6                                               | 6                  | Khrushkova   |
| 2.  | EA-20-TS-2          | Tsandripsh            | porch             | 3050-2020                                       | 3150-2019                                       | 11                                              | 10                                              | 10                 | Khrushkova   |
| 3.  | EA-20-TS-3          | Tsandripsh            | altar             | 5000                                            | 6                                               | 382                                             | The beginning of the 6th century                 | 6                  | Khrushkova   |
| 4.  | EA-20-TS-4          | Tsandripsh            | Southern wall     | 4200                                            | 7                                               |                                                 | 10                                              | 10                 | Khrushkova   |
| 5.  | EA-20-TS-5          | Tsandripsh            | arch              | 4700                                            | 6                                               |                                                 | 6                                               | 6                  | Khrushkova   |
| 6.  | EA-20-MU-12         | Musser                | Neighbor construc- | 4950                                            | 5-6                                             |                                                 |                                                 | -                  |                 |
| 7.  | EA-20-MU-4          | Musser                | Northern porch    | 4900                                            | 4900                                            | 5-6                                             | 6-7                                              | Rechuelishvili Berdzenshivili                       |
| 8.  | EA-20-MU-10         | Musser                | Main facade       | 4900-2020                                       | 4750-2019                                       | 6                                               | 371                                             | 10                                              | Vinogradov Voronov |
| 9.  | EA-20-MU-3          | Musser                | Northern wall     | 4000                                            | 7                                               |                                                 | 6-7                                              | Rechuelishvili Berdzenshivili                       |
| No. | Code     | Location  | Feature                      | X1  | Y1  | X2  | Y2  | Notes       |
|-----|----------|-----------|------------------------------|-----|-----|-----|-----|-------------|
| 10  | EA-20- MU-8 | Musser    | Altar northern apse         | 4300| 7   |     |     | -           |
| 11  | EA-20- MU-11 | Musser    | Gallery                      | 4100| 7   |     |     | -           |
| 12  | EA-20- MU-7  | Musser    | Organ loft coating          | 3500| 10  |     |     | -           |
| 13  | EA-20- MU-5  | Musser    | Altar outside                | 2500| 12  |     |     | -           |
| 14  | EA-20- MU-9  | Musser    | Western wall with organ lofts| 3200| 3300| 10  |     | Vinogradov, Voronov |
| 15  | EA-20- MU-13 | Musser    | Northern gallery facing     | 3550| 10  |     |     | Vinogradov, Voronov |
| 16  | C-20- LO-1  | LOO       | Southern portico            | 4070| 7   | 10-11|    | Ovchinnikova |
| 17  | C-20- LO-2  | LOO       | Of a fallen piece at the entrance | 3570| 10  |     |     | Ovchinnikova |
| 18  | C-20- LO-3  | LOO       | Column                       | 3100| 11  |     |     | Ovchinnikova |
| 19  | C-20- LO-4  | LOO       | Altar                        | 4050| 7   |     |     | Ovchinnikova |
| 20  | C-20- LO-5  | LOO       | Of the wall with inserts     | 4600| 7   |     |     | Ovchinnikova |

Regarding the rebuilding of the Loos Temple, B.B. Ovchinnikova notes that the samples of solutions from the synton in the central apse and the annex on the inner side of the southern wall differ in their lower strength, slightly different percentage of filler and mineral composition. According to her investigations, they were erected later, when miscalculations in the initial selection of the construction site became obvious and the southern wall deviated from the central axis of the temple. However, later this wall collapsed.

The solutions’ analysis of the Loo temple gave interesting conclusions. The altar, the South wall and the portico in front of it, according to the mortar, can be dated to the end of the 6th - beginning of the 7th century. The fallen fragment of the western wall dates to the 10th century, and the inserts into the columns - to the 11th century. All this suggests that the Lossky temple was reconstructed into a cross-domed one from an older structure in the X - XI centuries. Its pillars were reinforced, which matches the findings of B.B. Ovchinnikova.

**Summary**
Comparison of the temples’ architecture in Musser, Tsandripsh and Loo shows that the beginning of their construction can be attributed to the 6th-7th centuries. Their architectural features point to Syrian influence. In the 10th century, all three churches were rebuilt. It was then that a wall with an organ loft appeared in Musser and the northern gallery was rebuilt in the western part. The temple in Tsandripsh received a vestibule from the west. And the Loo temple was rebuilt into a cross-domed one. Thus, in our dating we join the conclusions of the majority of archaeological researchers.

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