Gelati Monastery Complex

The Church of the Nativity of the Virgin Mary

The North Entrance

Summary of the Survey of the Wall Paintings

2024

Stakeholder: Gelati Rehabilitation Temporary Committee

Summary

Context

The North entrance and North-East chapel of the Church of the Nativity of the Virgin Mary were built in the first half of the 13th century. Interior of the North entrance features two documented painted schemes. The lower painting, located on the East wall, dates to the 1520s and depicts the scene of Bagrat III's coronation as king, which is presented in a unique, original iconographic version. The upper painting, commissioned by Bishop Antoni Matskvereli between 1578 and 1583, covers almost the entire remaining space. The painting is one of the most important examples of post-Byzantine wall painting in Georgia. Together with other 16th-century paintings in Gelati, it clearly demonstrates the diversity of monumental painting of this era. The scheme's programme includes the Miracle of the Multiplication of the Loaves, the Nativity, John the Baptist in Prison and Beheading, and the depiction of saints and archangels. There are also donor figures. Part of the upper painted scheme was detached by restorers in the second half of the 20th century to reveal the lower scheme. The removed fragments—portraits of George II and his consort, Queen Tamar—are preserved in the cathedral. Additionally, beneath the upper painting scheme, small fragments with red paint can be found in the southern part of the east wall. The plaster layer of these fragments differs technologically from the plaster composition of Bagrat III's scheme (the lower painted scheme).

Physical history

The first recorded conservation interventions on the wall paintings of the North Entrance began in the 20th century, possibly in the 1950s, carried out by Shalva Abramishvili and Karlo Bakuradze(?). Further work was carried out in 1980-81 under A. Goglidze, who removed and transferred the portraits of George II and his consort, Queen Tamar from the east wall, and conserved paintings elsewhere (including edge repairs and fills, cleaning, paint fixing, removal of salts). In 2003-06, a diagnostic study was conducted, followed by an initial assessment in 2008 by Ms. N. Kuprashvili.

In 2017, substantial water infiltration occurred while the exterior stone facade was being conserved. In 2019, the chapel's tin roof was replaced with glazed ceramic, and in 2020, a temporary roof and gutter system were installed to prevent water ingress. Ongoing

monitoring of the facade and interior paintings has been conducted since summer 2020. In 2020, an assessment of the chapel's physical history and condition was carried out by the E. Privalova Technical Research Center for Painting, "Betania." In 2024, a full survey of the Entrance was completed as part of the current conservation programme carried out under the direction of the Gelati Rehabilitation Committee. Since September 2024, the chapel has been incorporated under a secondary temporary roofing structure, which will stay in place for the duration of the current conservation project.

Original technology

Painting scheme 1: Earlier Layer (undated)

The lower painted scheme is visible on the east wall of the entrance. The lime-based plaster contains both organic and inorganic inclusions. Inorganic aggregates are of various size and shape, mainly darker colour. The plaster has two types of organic inclusion (straw-like and transparent fibres). The plaster topography is uneven and has distinct tool marks. Plaster joins follow scene dimensions and figure forms. The plaster is similar to the 16th century scheme in the apse of the main space. The painting layers are well-preserved and maintain an appearance close to their original state. The palette is rich and vibrant, with gold tones ranging from light yellow to dark red. blue and green hues are abundant, complemented by white details and black elements.

Painting scheme 2: Main paintings (17th Century)

This scheme extends over almost the entire space. It is applied on a single lime-based plaster of varying thickness, containing a large amount of straw-like and less transparent fibrous organic inclusions (the former up to 11 cms in size), as well as small amount of fine inorganic aggregates. Charcoal inclusions are also present. The plaster is applied unevenly, plaster joins follow the original scaffolding levels and scene divisions. Preparatory techniques include geometric setting out and preliminary drawing, using incised and snapped lines, compasses, freehand incisions and painting. Some figures have preliminary white or yellow contour lines which are not followed in the final painting.

The painting has a rich colour palette including various hues of red, an earth-based yellow, a green, a greyish blue colour, probably attained from a mixture of white and black pigments, and also black and white paints. Gradations are achieved through layering or mixing for example, one red pigment was mixed with white and black pigments.

The application techniques of the North Entrance scheme differ from the main (central) space of the church of the Virgin Mary. here we have contrast colours building layering structure for modelling drapery. The unpainted plaster forms the background for some of the scenes, on which green, red and black paintwork is applied to shape the compositional features.

Unknown Painting scheme

A painting phase found between the upper and lower schemes is difficult to date. This layer of painted plaster cannot be attributed to Painted Scheme 1 due to differences in its plaster composition, nor can it be conclusively identified as the preparatory plastering for Painted Scheme 2.

Condition of the paintings

Although the condition of the painting is currently largely stable, certain concerns have been highlighted:

- **Plaster deterioration:** including discrete areas of plaster separation, which are widely present in the vault and, to a lesser extent, on the first register of painting.
- **Compromised painting:** an adhesive applied during previous conservation interventions has created an impermeable layer and provoke paint flaking[1].
- **Biological activity:** the primary biological activity appears to be algae, distributed on the south, west, and north walls at dado level, suggesting that a ground-level moisture source is partly responsible. Additionally, pink spots, resembling colonies, are visible and are simialar to the bioactivity observed in the main space.

  Salt activity: regarding salt crystallization, the following types are identified: crusts, crystalline dots, flakes, and white veils. These are widely distributed, affecting both the arch and the first register. Notably, solid salt crystals are finely embedded within the structure, while flaky salts (nitrate-containing) have undergone active deliquescence and recrystallization due to the environmental conditions. The solid crust-like crystals at dado level on the west wall occur in the vicinity of the bioactivity and are identified as calcite (probably from the plaster) and gypsum[2].

Based on both the physical history and on-site observations, it can be concluded that conservation interventions during the last century focused on addressing issues such as loss of plaster, detachment, salt deposits, and paint flaking.

Environmental conditions

The primary factor influencing the microclimate of the North Entrance is the macroclimate, as interior trends largely mirror exterior conditions. On the interiors of the northern buildings, absolute humidity (AH) levels in 2024 ranged between **2 and 23.5 g/m^3**. The trends of absolute and relative humidity are generally aligned: both increase during periods of atmospheric precipitation and decrease in dry weather. This pattern confirms that the exterior environment is the primary source of moisture.

[1] Adhesive materials used in the 1980s that have been identified in the main space include wax and acetate vinyl acetate - Analytical investigation undertaken in August-December 2024 by Steffen Laue, University of Applied Sciences Potsdam, Department of Conservation and Restoration, Science Laboratory

[2] Steffen Laue, Church of the Virgin (Gelati) Salt analyses – Part II, University of Applied Sciences Potsdam, Department of Conservation and Restoration, Science Laboratory

However, in summer, higher interior AH levels compared to exterior levels—particularly on days with little or no rainfall—may indicate the presence of an additional moisture source, such as **groundwater or an underlying spring channel**.

The thermo-hygral behaviour of the chapels on the north side exhibits weak buffering, providing limited regulation of exterior humidity and temperature, which is associated primarily with air exchange via doors and windows. The North Entrance has one principal door to the exterior, which is frequently open, and two internally communicating doors, which also allow additional air movement and exchange. A large glazed window allows sun light to enter the space easily, which influences temperature fluctuations.

In 2024, relative humidity (RH) showed notable seasonal and monthly fluctuations:

- Winter: High RH (≥70%) is recorded for approximately one-third of the season (31.8%). Minimal RH value 27%, maximum RH value 95%.
- Spring: High RH (≥70%) occurs almost half of the season (46.56%). Minimal RH value 33.5%, maximum RH value above 95%.
- Summer: High RH increases significantly, for 88% of the time. Minimal RH value 40%, maximum RH value above 95%.
- Autumn: High RH (≥70%) occurs less frequently, lasting 13% of the time. Minimal RH value 40%, maximum RH value above 95%.

RH levels below 40% were detected for only a small fraction of time in the spring, autumn, and winter seasons (about 7%), while in summer, they did not drop below this threshold at all.

Relative humidity swings on the interior, while not as extreme as those the exterior, are nevertheless wide, reflecting these external circumstances. According to the 2024 data, annual temperatures on the exterior range from -3.95°C to 39.05°C. On the interior of the Northen Entrance, recorded temperatures vary between 5.69°C and 30.27°C. Interior fluctuations are primarily limited to daily changes of up to 2°C and monthly changes of 5-9°C, although in April of this year a 11.74°C difference occurred.

The influence of these environmental conditions on deterioration of the wall paintings is significant, especially in promoting cycles of damaging salt deliquescence-crystallization. A particular concern are nitrate containing **salts**, which have been identified at dado level on the north wall and can be reasonably assumed to be present elsewhere.

Example of Monitored Impacts (daily, monthly, seasonal):

2023

- December 16: salts crystallized as relative humidity ranged from 47% to 69%.

2024

- February: slight reduction in salts observed, with relative humidity ranging from 90% to 95% (6 – 7 °C).
- Spring: no visible changes occurred during this period (March 20, 2024: 71–74% RH; May 11, 2024: 60–75% RH).
- June 28: significant salt efflorescence observed (76–80% RH; 20-21.5°C), interrupting the period from May-June period when mostly very high RH values were recorded.
- July 26: part of the salts dissolved (69–94% RH; 22-24°C).

  August 12–13: when RH levels over 90% were recorded, visible salts began to deliquesce, a process that was completed by the next day with persistence of the same high RH (RH exceeding 90%; 23°C).
- September 26: salts recrystallized (58–72% RH; 19-21°C).
- November 6: no changes recorded (49–55% RH).
- December 7: recrystallization of salts (42% RH).

Summary:
The complete dissolution of nitrate salts in the northern entrance occurs at a relative humidity exceeding 90% (T - 23°C) while crystallization is recorded when conditions vary between 42%–75% RH (19-21°C). It is noteworthy that no salt phase changes occurred during the spring (60%–75% RH) or in November (49%–55% RH).

In terms of seasonal trends, salt crystallization was observed in winter, remained unchanged during the spring, crystallized again in early summer (June), completely dissolved in late summer (August), recrystallized in autumn, and crystallized once more in winter.

List of documentation:

Survey of wall painting technology and condition at the North Entrance of the Church of the Virgin Mary in Georgian
Painting schemes of the North Entrance of the Church of the Virgin Mary in both languages
Graphic Documentation of the condition of the wall paintings and plaster joins in both languages
Environmental Monitoring Report for Northen buildings 2024 in Georgian and partly in English
Gelati, Church of Virgin, Envrionmental Monitoring report 2023 in English
Gelati, Church of Virgin, Envrionmental Monitoring report 2020-2022 in English
Gelati, Church of Virgin, Envrionmental Monitoring report 2021_September in English