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IN THIS ISSUE

- Minasyan, Tamara & Eliazyan, Gayane & Khorozian, Armin**
A Codicological, Artological and Material Analysis
of the Gospel Matenadaran 378 in the Context
of the Artsakh Manuscript Tradition of the 13th Century **3**
- Ivan V. Bogdanov**
On Birds and Beasts in the Donation Formula
on the Satrap Stela (URK. II: 20.13) **39**
- Serge A. Frantsouzoff**
A Sabaeen Goddess in Ḥaḍramawt and Some Peculiarities
of Her Cult at the Temple Raḥbān (Site Raybūn) **50**
- Artiom V. Mesheznikov, Tatiana V. Klementeva**
Sanskrit Fragments of Hīnayāna Sūtras (SI 3332/20, SI 3333/1)
in the Serindia Collection of the IOM RAS **91**
- Tatiana V. Ermakova**
Ceylonese Buddhist Priest Subhuti's Letters to I.P. Minayev:
Preface, publication, commentaries **107**

ON THE COVER:

Pl. 11d. Fragment of the inscription SOYCE 1898 + 1897a-b + 1833a-e
(Materials of the Soviet-Yemenite Complex Expedition.
Courtesy of Serge A. Frantsouzoff's Private Archive.)

Minasyan Tamara, Eliazryan Gayane, Khorozyan Armin

A Codicological, Artological and Material Analysis of the Gospel Matenadaran 378 in the Context of the Artsakh Manuscript Tradition of the 13th Century

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Abstract: Manuscript 378 (Ms. 378), housed at the Mesrop Mashtots Matenadaran in Yerevan, is the oldest illustrated manuscript to have reached us from Artsakh (Nagorno-Karabakh), dating back to the 13th c.¹ Although the colophons do not specify the exact location where the manuscript was created, the information they contain suggests that it was written either in an ancient sanctuary on the site of the current St. John the Baptist Church in Gandzasar, or in the nearby Khokhanaberd fortress, which was the residence of princes.² This hypothesis is substantiated by the fact that the St. John the Baptist Cathedral in Gandzasar was constructed after the creation of the Gospel, and the territories were already the princely domains of the Hasan-Jalalyans.³ The study is structured in two main parts. The initial section presents a codicological and artistic analysis: the miniature system of Ms. 378 (comprising canon-tables, title pages, marginal ornaments and iconographic features) is considered in the context of the continuity of the Armenian tradition and regional interactions. These observations are complemented by manuscript colophons, which act as a significant source for the study of the history and cultural environment of Artsakh in the 13th c. The codicological and artistic analysis of the first part is complemented by the chemical and material study presented in the second part, which

¹ *Main catalogue of Armenian Manuscripts of Mashtots Matenadaran* II 2004: 139.

² MINASYAN 2015: 13–15.

³ GANDZAKETS'I 1961: 269–270. The Hasan-Jalalyan princely house, which traces its lineage to the Aranshahik noble family of eastern Armenia, experienced a period of significant growth and expansion during the 12th c., specifically in the 1160s. This expansion coincided with the reign of Vakhtang the Great (late 11th c. and early 12th c.). He was succeeded by his son, Hasan the Great, in the 12th c., after which the throne was passed to Hasan's son, Vakh-tang-Tangik, who died in 1214. During the reign of these princes, the political and economic foundations for the subsequent rise of Nerkin Khachen were established, which later enabled Hasan-Jalal Dola to ensure an unparalleled economic, cultural and political rise in Nerkin Khachen during his reign. After him, the princely branch of Nerkin Khachen came to be known as Hasan-Jalalyans, with the principal spiritual and political centre being the Gandzasar monastery. This monastery functioned as a princely and Catholicosate centre for centuries (ULUBABIAN 1975: 135–141).

allows for an assessment of the technical basis of the manuscript's creation and the exclusivity of the materials used. The study revealed the presence of high-value dyes, including cochineal, ultramarine, safflower, lead white and high-purity gold. The results obtained permit a new and comprehensive evaluation of the artistic and historical merits of the manuscript, emphasising its exceptional material basis. Consequently, the Ms. 378 is regarded not only as an artistic treasure and historical source, but also as a significant material for interdisciplinary research, which occupies a substantial place in the study of Armenian medieval codicology and cultural history.

Key words: Ms. 378 Gospel, Artsakh, 13th c., Gandzasar Monastery, miniature, iconography, colophons, dyes, X-ray fluorescence analysis (XRF), infrared spectroscopy analysis (FT-IR).

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Introduction

In the early 13th c., coinciding with a period of Armenian cultural flourishing, scriptoria adjacent to monasteries underwent substantial expansion and transformation, becoming the primary centres of book art and miniature painting. Although scriptoria had been in existence for several centuries earlier, it was during this period that their activities reached a highly developed and more organised form.⁴ Artsakh, as a significant centre of Armenian cul-

⁴ MATEVOSYAN 1998: 77–104.

ture, is distinguished by its rich tradition of manuscript art, one of the earliest and most symbolic monuments of which is the Ms. 378.⁵ It was written by the scribe Toros at the behest of Prince Vakhtang Tangik and Princess Khorishah, as evidenced by the manuscript's colophons.⁶ In academic discourse, the Gospel is often referred to as the "Gospel of Vakhtang Tangik"⁷ and it has garnered the attention of numerous researchers, particularly those specialising in art history.⁸ However, given that Vakhtang and Khorishah are listed together in the colophons as commissioners, it is deemed appropriate, in the interest of source studies, to utilise the designation "Gospel of Vakhtang Tangik and Khorishah".⁹

Ms. 378 is distinguished not only by its artistic merit, but also by its historical value. It constitutes a highly artistic exemplar of 13th c. writing and miniature painting, which simultaneously provides evidence for the formation of the manuscript tradition of Artsakh and the rise of Armenian culture.¹⁰

Methodology

The research methodology employed an interdisciplinary approach, integrating codicological, artological, and materials science frameworks. A codicological analysis was conducted to examine the structural and content features of the manuscript. Subsequent artological observations were then performed in order to reveal the iconographic and stylistic layers of the miniature system.¹¹ Finally, source studies interpretation was carried out to analyse the manuscript's colophons as a significant source of information on the history and cultural environment of Artsakh in the 13th c.¹²

⁵ HAKOBYAN & MINASYAN & TOROSYAN 2022: 35–36.

⁶ MATEVOSYAN 1984: 94–95.

⁷ HAKOBYAN 1989: 38–50.

⁸ SVIRIN 1939: 82; LAZAREV 1947: 186–188; HOVSEPYAN 1951: 761–764; DURNVO 1979: 248.

⁹ MATEVOSYAN, MINASYAN 2025: 86.

¹⁰ HAKOBYAN & MINASYAN & TOROSYAN 2022: 37, 142–150.

¹¹ HAKOBYAN 1989: 38–50.

¹² Matenadaran MS. 378: ff. 2a, 7a, 8b, 9b, 258b, 304b, 308a. URL: <https://www.researchgate.net/publication/346107617>.

The material study was conducted using non-destructive methods, incorporating X-ray fluorescence (XRF) and infrared spectroscopy (FT-IR) analytical approaches (see Chemical Analysis, Pl. 1). XRF was utilised for the identification of the elemental composition, while FT-IR was employed for the identification of the composition of organic materials and binders.¹³

The study's structure involves the arrangement of manuscript miniatures according to thematic sections. The subjects of the miniature material are extensive, and numerous images are presented in two parts. The codicological and artistic analysis of the first part is complemented by the chemical and material study presented in the second part. The figures pertaining to chemical analysis are primarily located in the second section, accompanied by the pertinent data. These were not incorporated in the initial section to avoid redundancy and superfluous presentation of the subject matter. In the first section, therefore, links are provided to the figures in the second part. This approach facilitates a comprehensive, systematic and legible presentation of the material.

1

1.1. Gandzasar monastery as a scriptorium

During the 13th c., the Gandzasar monastery emerged as the preeminent spiritual, cultural and writing centre of Artsakh, operating under the patronage of the Hasan-Jalalyan princely house. Gandzasar is mentioned in written sources as early as the 10th c.¹⁴ and between the 12th and 13th cc. it was an episcopal see and the royal sepulchre¹⁵ of the Khachen¹⁶ princes. From the 14th c. it became the seat of the Catholicosate¹⁷ of the Armenian East (Gandzasar). These circumstances contributed to the establishment of the scriptorium.

¹³ DERRICK & STULIK & LANDLY 1999: 43–79; CENTENO & GUZMAN & KLEPS & DELLA VÉDOVA 2004: 139–150.

¹⁴ ANANIA 2009: 42.

¹⁵ JALALEANTS 1842: 186–192.

¹⁶ In the early Middle Ages, Artsakh was frequently referred to as Khachen. Subsequently, the name Khachen was adopted for one of the provinces of Artsakh. KALANKATVATS'I 2011: 432; GANDZAKETS'I 1961: 209.

¹⁷ BALAYAN 2009: 171–188.

The development of the scriptorium was influenced by the spiritual and royal function of the monastery, as well as by the educational environment, where scribes and miniature painters were trained. The early written tradition of the monastery, which is mentioned already from the 10th c., provided the prerequisites for the formation of the school. Despite the absence of preserved manuscripts from the 10th–11th cc., and the reliance on written sources as the primary evidence,¹⁸ the 12th c. sources (Mkhitar Ayrivanetsi¹⁹ and Continuator of Samvel Anetsi²⁰) attest to the destruction and loss of manuscripts due to the Seljuk-Turkish invasions. This fact indicates the presence of a well-established written culture in Artsakh, the continuity of which was fully realised in the 13th c. by the Gandzasar scriptoria.

Theological, ritual, historical and interpretative manuscripts were copied in the Gandzasar scriptorium. The monastery housed a Matenadaran, which contained a rich collection of manuscripts. Thirteen manuscripts of the 13th–18th cc. copied here have been preserved, of which twelve are located in the Mashtots Matenadaran in Yerevan,²¹ and one in the library of the St. Jacob Monastery in Jerusalem (Jerusalem, manuscript 2273).²² Moreover, a collection of manuscripts that have been copied in other scriptoria across Armenia has been preserved in the Gandzasar Matenadaran. Of these manuscripts, approximately three dozen have survived, providing a testament to the profound activity of the monastery's scriptorium.²³

The Ms. 378 is the most ancient manuscript from Gandzasar that has been preserved; it was created at the beginning of the 13th c., even before the construction of the Church of St. John the Baptist (1216–1238). This indicates that the scriptorium was operational during the early stages of construction.

The manuscript tradition of Gandzasar is further augmented by the construction record of the monastery, comprising 27 lines and constituting an exceptional document (Pl. 1)²⁴.

¹⁸ KALANKATVATS'I 2011: 421; ANANIA 2009: 42.

¹⁹ AYRIVANETS'I 1890: 63.

²⁰ ANETS'I AND CONTINUATORS 2014: 213.

²¹ MINASYAN 2015: 13–21.

²² POGHARYAN 1974: 366.

²³ MINASYAN 2015: 21–23.

²⁴ BARKHUDARIANTS' 1982: 38–40.



Pl. 1. Gandzasar construction inscription (photo Samvel Karapetyan)

It chronicles the construction process and its culmination, while also incorporating the testimony of the builder, Hasan Jalal Dola. In this testimony, Dola presents himself as a “humble servant of God” and simultaneously as “the native sovereign of the high and great Artsakh world”. The inscription enumerates three significant dates: the commencement of construction in 1216, the completion of the edifice in 1238, and the consecration of the church in 1240.²⁵ Considering the historical value and scientific significance of the inscription, it is deemed appropriate to present it partially, with a focus on the most salient elements: “I, the humble servant of God Jalal Dola Hasan, son of Vakhtang, grandson of the Great Hasan, native and sovereign prince of the high and great Artsakh, the lord of Khokhanaberd and its borders. As my father passed away, he made a bequest in his last will that was intended for my mother, Khorishah (Khorishah was the daughter of the great prince Sargis), and myself, and stated that we should erect this church in our ancestral cemetery at Gandzasar. The commencement of construction was

²⁵ BARKHUDARIANTS' 1982: 38–40.

initiated in the Armenian year 1216, with the help of the benevolent God. I, having this work in my mind in this busy life, did not stop working and by the grace and mercy of the most merciful God, completed the church in 1238, adorning it with various reliefs and the dome with various compositions. The church was consecrated in 1240 during the reign of Catholicos Nerses of Aghvan”.

This inscription indicates that Gandzasar was constructed not only as a spiritual centre, but also as a symbol of power and culture, emphasising that Artsakh was perceived in the Middle Ages as a “high and great world”, where spiritual, political and cultural layers were intertwined. Utilising the aforementioned rationale, the colophons of Ms. 378 emerge as invaluable documents, providing a crucial complement to the information contained within the inscription. These colophons offer a comprehensive insight into two key aspects: firstly, the historical milieu that served as the backdrop for the manuscript’s creation, and secondly, the interrelationship between the patronage of the princely house and the spiritual life. Consequently, the Gandzasar inscription with the Gospel colophons, provides a comprehensive representation of the political, cultural and spiritual reality of Artsakh during the 13th c.

1.2. Circumstances of the creation of Ms. 378

As previously stated, Ms. 378 is regarded as one of the earliest and most valuable testimonies of the Gandzasar manuscript school. Toros is mentioned as a “humble scribe and painter” (Ms. 378, ff. 2r, 3v, 9v, 258v), suggesting that he was also the author of miniatures. The headpiece on folio 9b is of particular interest: on a dark blue background, the names of the patrons Vakhtang and Khorishah and their colophon are written in gold, and below this inscription, on a vertical column, Toros has written his name in red: “Toros the Painter” (see Chemical Analysis, Pl. 6). Despite the absence of extant manuscripts of Toros, his work in Ms. 378 evinces a high level of mastery and artistic quality.

The manuscript’s chronology remains controversial, as the date of its creation was not preserved due to the lack of the scribal colophon on the folio. This circumstance has given rise to various chronological hypotheses among researchers.

Garegin Hovsepyan has determined the year of composition of the manuscript to be between 1212 and 1216.²⁶ The basis of the author's work is the assertion that Princess Khorishah rebuilt the church of Metsaranits Saint Hakob, not far from Gandzasar, in 1212,²⁷ and that Prince Vakhtang, according to the inscription of the Gandzasar monastery, died before 1216.²⁸ Vardan Areveltsi has noted that Vakhtang died in 1214, which provides a solid basis for placing the creation of the manuscript in the above-mentioned time period.²⁹

Artashes Matevosyan places the manuscript among the 1216 colophons,³⁰ while Bagrat Ulubabyan considers it to have been written in 1212.³¹ Alexey Svirin³² and Asatur Mnatsakanyan³³ posit the hypothesis that the manuscript was copied towards the close of the 12th c. or the onset of the 13th c. These views and historical facts indicate that the manuscript was most likely created in the first decades of the 13th c., with a probable date of between 1212 and 1214.

The early dating is also based on paleographic and iconographic features. The text is written in a late uncial script, distinguished by large and symmetrical letterforms, a straight linear structure, a system of *Nomina sacra* abbreviation and the full stop at the top of a word.³⁴ By the way, from the 11th c. onwards, punctuation marks were utilised as aids for both reading and pronunciation.³⁵ The Eusebius' Letter to Carpianus, the Table of Concordance (also the marginal ones) are written in small uncial script. The scribal colophons are written in vertical uncial script, distinguished by the rectangular structure of the letterforms and lines of equal height. This script type is considered to act as a transition from classical uncial script to round script from the 11th–12th cc. The colophon of 1261 has already been written in a large round script (Pl. 2).

²⁶ HOVSEPYAN 1951: 761–764.

²⁷ BARKHUDARIANTS' 1982: 12; BARKHUDARIANTS' 1895: 171.

²⁸ BARKHUDARIANTS' 1982: 38.

²⁹ VARDAN VARDAPET 1862: 140.

³⁰ MATEVOSYAN 1984: 94–95.

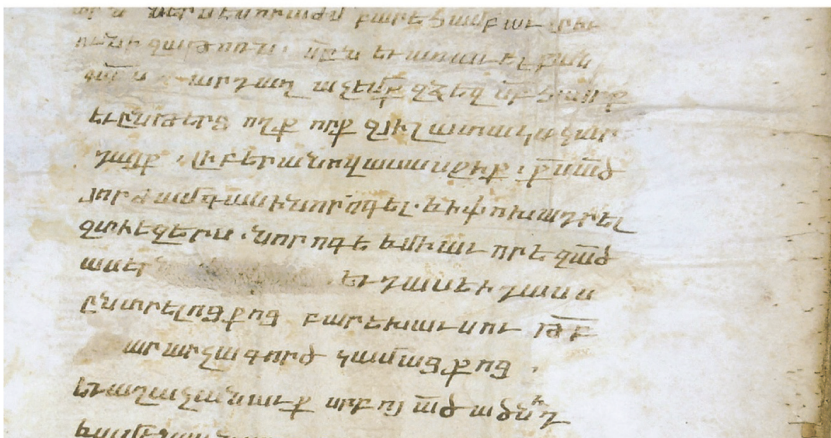
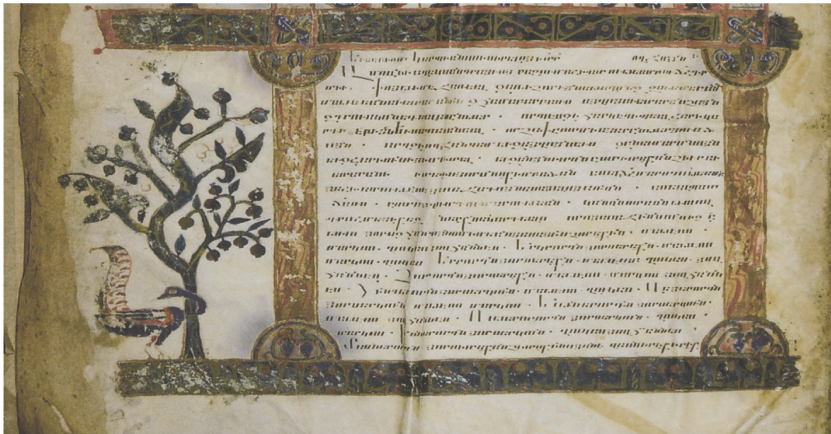
³¹ ULUBABIAN 1975: 142–144.

³² SVIRIN 1939: 82.

³³ MNATS'AKANIAN 1955: 620.

³⁴ For more on these scripts, see ABRAHAMIAN 1973: 61–77.

³⁵ STONE & KOUIMJIAN & LEHMANN 2002: 25–30.



Pl. 2. Script sample, marginal ornament and decorated letter

The absence of images depicting the Lord constitutes significant evidence for the early dating of the manuscript, given that such iconographic motifs are found in Artsakh manuscripts only from the end of the 13th c. and 14th c.³⁶

The Gospel is written on parchment of a superior quality, and consists of 308 leaves. The object's dimensions are 34×24.5 cm. The written content is presented in two columns, with a total of 17 lines per page. The binding is composed of brown leather, with a door, the core is constructed from board, and the lining is made of yellow silk. As for the content of the manuscript, it comprises Eusebius' Letter to Carpianus, the Tables of Concordances and the four Gospels. From a textual perspective, the Gospel of John is a subject of interest: some verses are omitted, about which the scribe left special notes. This indicates that they are not a loss, but rather the result of the scribe's conscious and intended approach.³⁷

1.3. The historical value of the colophons of Ms. 378

Ms. 378 comprises a series of colophons that yield significant information regarding the creation, donation, and subsequent fate of the book. Vakhtang Tangik and Khorishah commissioned the Gospel in commemoration of their family. As stated in one of the colophons: "By the order and expense of the pious and God-pleasing Vakhtang, the son of Hasan and grandson of Vakhtang, and his Christ-loving wife, Khorishah, who is the daughter of the great commander-in-chief Sargis, it was desired that our names be inscribed in the living book, in the confidence of God's love for humanity. The task of producing this life-giving and desirable Holy Gospel was entrusted to be written adorning it with various medicines, embellishing the Tables of Concordances and decorating the beginning of the Gospels with golden letter, ensuring the eternal remembrance within the house of the Lord" (Ms. 378, f. 308rv).

This colophon not only clarifies the circumstances of the manuscript's creation, but also confirms the spiritual and cultural role of the commissioning princely family. It is consistent with the construction inscription of the Gandzasar monastery, which also emphasises the names and origins of

³⁶ LAZAREV 1967: 112–115.

³⁷ *Main catalogue of Armenian Manuscripts of Mashtots Matenadaran* II 2004: 139.

Vakhtang and Khorishah, thereby testifying to the historical connection between the manuscript and the monastery.³⁸

Hasan's son, Vakhtang Tangik, was a prince of the Nerkin (Lower) Khachen (Artsakh) clan, and Khorishah was the daughter of Sargis Zakaryan, the supreme commander of the Georgian-Armenian joint forces, and the sister of Zakare and Ivane Zakaryan, the *de facto* rulers of northern Armenia at the beginning of the 13th c. This parallel observation lends the manuscript both local and pan-Armenian historical value, underscoring the pivotal role of the princely family in the preservation of cultural heritage.

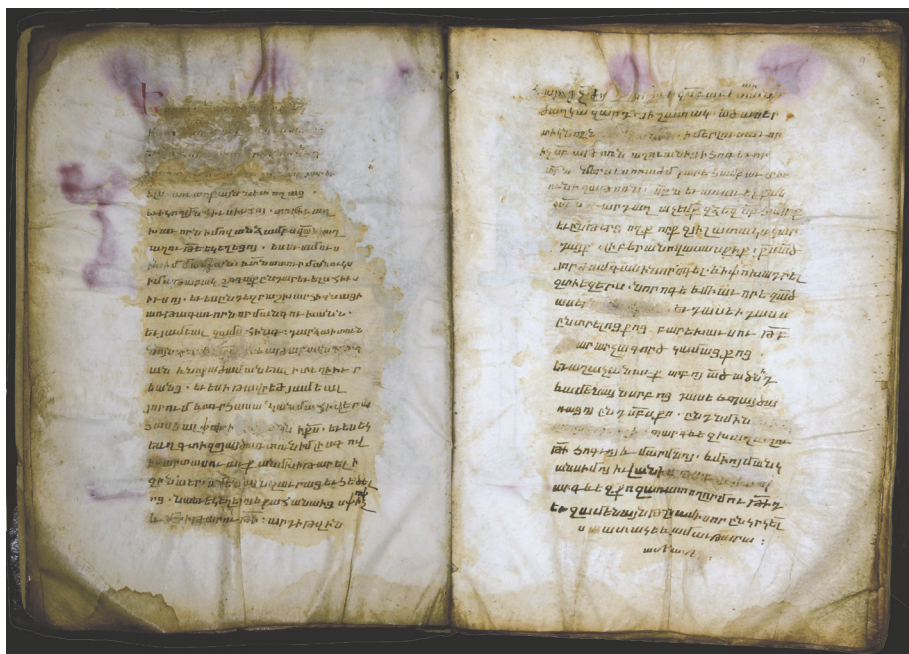
The colophons appended to the manuscript also convey the subsequent history of the commissioning family. Hasan Jalal Dolan, the offspring of Vakhtang and Khorishah, after the death of his father assumed the role of prince of Nerkin (Lower) Khachen and patron of the Gandzasar monastery construction. The construction of the church was executed in accordance with the stipulated will of Vakhtang Tangik: Hasan Jalal commissioned the construction of a new church in front of Khokhanaberd, in a location known as Gandzasar, on the site of a previous sanctuary. It was dedicated to John the Baptist and was notable for its architectural magnificence and its beautiful composition.³⁹ This suggests that prior to the construction of the new church, a scriptorium had already been established in Gandzasar, which indicates that the manuscript tradition preceded architectural innovation.

The Gospel was passed down from parents to Hasan Jalal, who, following the death of his wife Mamkan, donated it to the Gandzasar monastery in 1261. His colophon, preserved on page 8v of the manuscript, is of great historical value, as Hasan Jalal recounts in detail his arduous five-year journey to the court of Mangu Khan, the journey back, and the death of his wife (Pl. 3).

It is worthy of note that the colophons record the continuity of the four generations of the princely house: Vakhtang the Great-Hasan the Great-Vakhtang Tangik-Hasan Jalal Dola. This genealogical chain endows the manuscript with exceptional historical value, as it concurrently documents the hereditary rights of the princely house. The same chain is also recorded in the construction protocol of the Gandzasar monastery, which once again confirms the historical connection between the manuscript and the monastery.

³⁸ BARKHUDARIANTS' 1982: 38.

³⁹ GANDZAKETS'I 1961: 269–270.



Pl. 3. Ms. 378, the Hasan Jalal Dola's colophon of 1261

The colophons furnish us with information regarding the subsequent fate of the manuscript. During the plundering of the Gandzasar monastery in the 16th century, the manuscript was captured. However, in 1589, Prince Jalal, son of Mehrab Beg, redeemed it and returned it to the Gandzasar monastery. The following information is documented in the colophon: “Thus I received the Holy Gospel from captivity... and presented it to the holy monastery of Gandzasar” (Ms. 378, f. 7r).

In 1897, the final folios of the manuscript were restored by Sahak Vardapet Amatuni, a monk of the Mother See of Holy Etchmiadzin, who was both a codicologist and philologist. This fact is also recorded in a colophon (Ms. 378, f. 304v). The scribal colophon of the Gospel and three other folios (ff. 305–308) were torn from the manuscript over time for unknown reasons and were used as a guard leaf in a Synaxarion written in 1497 (MM 1508). The discovery of these folios was made by Sahak Vardapet Amatuni, who also undertook their restoration. It is regrettable to note that the folio recording the date of the manuscript's composition was not among these folios.

It is evident that the colophons of the Ms. 378 serve a dual purpose in that they not only document the history of the manuscript's creation and donation, but also highlight the spiritual and cultural role of the princely house. The construction inscription of the Gandzasar monastery, considered in conjunction with the aforementioned colophons, provides a comprehensive historical depiction, uniting family commemoration, lineage authority and the continuity of the monastic heritage.

1.4. Miniature and iconographic system

The Ms. 378 is distinguished by a multi-layered and systematic structure of the miniature, which expresses the high level of formation of the Artsakh artistic school of the 13th c. The scribe and painter Toros created ten canon-tables, three title pages, a portrait of Matthew the Evangelist (Ms. 378, f. 6v) and rich marginal ornaments. They are constructed on the basis of thematic, symbolic and compositional principles, thereby forming a harmonious artistic whole. The symbolic features of the miniatures are evidently associated with the architectural-sculptural composition of the Gandzasar temple. This connection is manifested in a number of stylistic parallels, including the three-column structure of the canon-tables, cross-shaped textures and the use of plant motifs. The same artistic elements are also present in the sculptural decorations of the temple.

Of particular interest are the lion-dragon images of princely symbolism (see Chemical Analysis, Pl. 4, 14), which in the manuscript reflect the lions symbolising the Hasan-Jalalyans. The headpieces of the canon-tables (Ms. 378, f. 7v–8r) depicting lions fighting dragons are a continuation of the symbolic iconography that is also found in the sculptural ornaments of the entrance to the Gandzasar temple (Pl. 4).

The artist chose to leave the dragon in its natural parchment shade, while utilising yellow and black for the lions. This solution is twofold: it is both decorative and symbolic. It serves to emphasise the idea of the power and victory of the princely dynasty. Similar motifs are also found in the frescoes of Geghardavank (1258) and in the Ani manuscripts, which indicates the prevalence of symbolic iconography.⁴⁰

⁴⁰ SVIRIN 1939: 85.



Pl. 4. Reliefs of lions at the entrance to Gandzasar Monastery
(photo Hrair Hawk Khatcherian)

The parallels observed, in conjunction with the identity of the client, suggest that the manuscript and the temple were both created within the same artistic and ideological milieu. A comparative observation of the richness of the temple's sculptural decorations⁴¹ also indicates the use of the same artistic and symbolic language in both manuscript art and the architectural-sculptural composition, revealing a unified artistic environment formed in Artsakh in the 13th c.

1.5. Canon tables, system of colour and marginal ornaments

The canon tables of Ms. 378 are arranged in a three-column structure. The configuration of the cross-shaped twin-rope weaves in the central part is a symbolic representation of the unity of eternity and faith (Pl. 5).

The bases and capitals of the columns are decorated with cross-shaped figures, floral and geometric motifs (see also Chemical Analysis, Pl. 4, 14). The trefoils found in the headpieces act as sacred symbols, which were also widely used in the manuscripts of the Cilician School.⁴²

The colour system is predicated on the principle of compositional balance, whereby dark shades (green, blue, brown, purple) are juxtaposed with bright colours (pink, white, yellow, red). The application of gold serves to enhance the visual opulence of the images.⁴³ The colour harmony and symbolic depth are confirmed by the highly artistic solutions of Toros' colour system.

⁴¹ DONABÉDIAN 2023: 24–27.

⁴² HAKOBYAN & MINASYAN & TOROSYAN 2022: 142–145.

⁴³ HAKOBYAN & MINASYAN & TOROSYAN 2022: 147.



Pl. 5. Ms. 378, canon table:
the colophon of the commissioners on the vertical beams: 6r



Pl. 6. Ms. 378, Matthew's title page, marginal ornament and decorated letter: 11r

Chemical analyses have shown that the dyes utilised are of a high quality: blue was obtained from ultramarine (lapis lazuli), green from Verona green earth, brown from walnut ink, red from Armenian cochineal, purple from cochineal mixtures, pink from a light shade of cochineal, white from lead white, and yellow from safflower. The creation of symbolic layers was achieved by utilising high-purity gold (60–95%), thereby accentuating the visual elements of the composition.⁴⁴ It is evident from the data presented that the manuscript under consideration exhibits a high artistic sophistication, thereby providing compelling evidence of the trade and cultural connections that characterised medieval Armenia.

Ms. 378 is also rich in marginal ornaments, which include bird figures, plant textures, and symbolic images.⁴⁵ The decorated letters are primarily knotted script, and the initial letters executed in gold script. Toros frequently employs acanthus ornaments and the design of small crosses, which shine with their light shades on a dark green and blue background. (Pl. 6).

The initial appearance of these motifs is documented in the 11th c. “Muḥni Gospel” (Ms. 7736), and their subsequent utilisation in the miniature painting of Arts’akh and Utik’ is well-attested.⁴⁶ L. Durnovo identifies stylistic affinities between the marginal ornaments and the Homilies of Mush, and likens the plant ornaments to the ornamental system of the Echmiadzin Gospel.⁴⁷

1.6. Thematic images

Thematic images contained within the manuscript are limited in number. The title page of John (Ms. 378, f. 259r) depicts the scene of the “Ascension” with Christ in a halo and four angels (Chemical Analysis Pl. 12). Folio 5v depicts the Virgin Mary holding the Christ child, with the angel Gabriel positioned to her right. Beneath this scene, two evangelists are represented, accompanied by the respective inscriptions: “Mariam”, “Gabriel”, “Evangelists”. In the case of the latter, it is challenging to ascertain which two they are (Chemical Analysis, Pl. 9). This thematic image was most likely added after the manuscript was copied, because its style stands out from the artistic

⁴⁴ OSPITALI & BERSANI & DI LONARDO & LOTTICI 2008: 1066–1073.

⁴⁵ HAKOBYAN 1989: 50.

⁴⁶ HAKOBYAN & MINASYAN & TOROSYAN 2022: 146.

⁴⁷ DURNOVO 1978: pl. 3.

decoration of the manuscript. This observation was initially made by Irina Drampyan and Emma Korkhmazyan, who noted that the image exhibits stylistic affinities with monumental art.⁴⁸ Subsequently, this observation was also addressed by H. Hakobyan.⁴⁹

The image of Mary in the Gospel can be seen as being in close alignment with the sculptural images of the Gandzasar temple in terms of symbolic layers. In the manuscript, the figure is depicted as a divine mediator between the faithful and Christ; in the sculptures of the Gandzasar temple, her image assumes a power-protective significance, which is related to the symbolism of the Hasan-Jalalyan environment. It is evident that the iconographic languages of the manuscript and the temple complement each other creating a unified ideological system. In this system, the image of Mary serves as a unifying element, representing both spiritual and secular power. The sculptures were examined by Z. Hakobyan and T. Avetisyan, who provided commentary on their iconographic significance.⁵⁰ This study proposes a new observation concerning the ideological connection between the painting and the sculpture.

In the margin of page 254r of the manuscript, there is a portrait of Joseph of Arimathea. The sketch portrait of Matthew the Evangelist, which is located on page 6v, appears to be more of a painting experiment than a complete iconographic composition, which testifies to Toros' searches and stylistic experiments.

1.7. Chemical and material analysis

The colophon of Ms. 378 states that the patrons commissioned the manuscript to be decorated with “many and various medicines” (Ms. 378, f. 308v), where the word “medicine” is used to denote a dye. The veracity of this information has been corroborated by contemporary chemical and material analysis, which has revealed a broad and remarkable array of dyes and binders.

The manuscript was illustrated with Armenian cochineal, ultramarine blue, safflower yellow, lead white, and high-purity gold. The parchment is

⁴⁸ DRAMPYAN & KORKHMAZIAN 1976: 59.

⁴⁹ HAKOBYAN 1989: 46.

⁵⁰ HAKOBYAN & MIKAYELYAN & ASRYAN & AVETISYAN 2023: 33.

composed of meticulously processed and burnished high-quality leather. Iron gall ink was utilised in the written surface, while walnut ink and cochineal were employed in the creation of miniature decorative elements.⁵¹ Furthermore, analysis by means of Fourier-transform infrared spectroscopy (FT-IR) revealed the presence of vegetable binders, namely gum arabic and egg yolk. Gum arabic was utilised for the creation of transparent layers, while egg yolk was employed for the purpose of colour thickening. This ensured the durability and long-term preservation of the pigments.⁵²

Evidently, the manuscript colophon and the results of modern scientific analysis provide complementary evidence. This finding lends further support to the hypothesis that the Gospel was embellished with superior materials by means of sophisticated artistic techniques.

Detailed data and spectral results of the chemical and material analysis are presented in the second part of the article: Chemical Analysis of Ms. 378.

2

Chemical Analysis of MM-378 Gospel Armenian Manuscripts

The study employed the following analytical techniques and instrumentation:

1. X-ray Fluorescence Spectroscopy (XRF)

Analyses were conducted using a portable HITACHI XRF instrument operating at a maximum acceleration voltage of 45 kV and current (μA). Measurements were taken over 25 seconds with an approximate spot size diameter of 50 mm². (Pl. 1)

2. FT-IR Spectroscopy

A Bruker LUMOS FT-IR spectrometer was utilized, covering a spectral range of 4000–600 cm⁻¹ with an accuracy of 4 cm⁻¹.⁵³ (Pl. 1)

3. Dino-Lite Digital Microscope

A Dino-Lite microscope with 1.3 MP resolution was employed for detailed imaging. (Pl. 1)

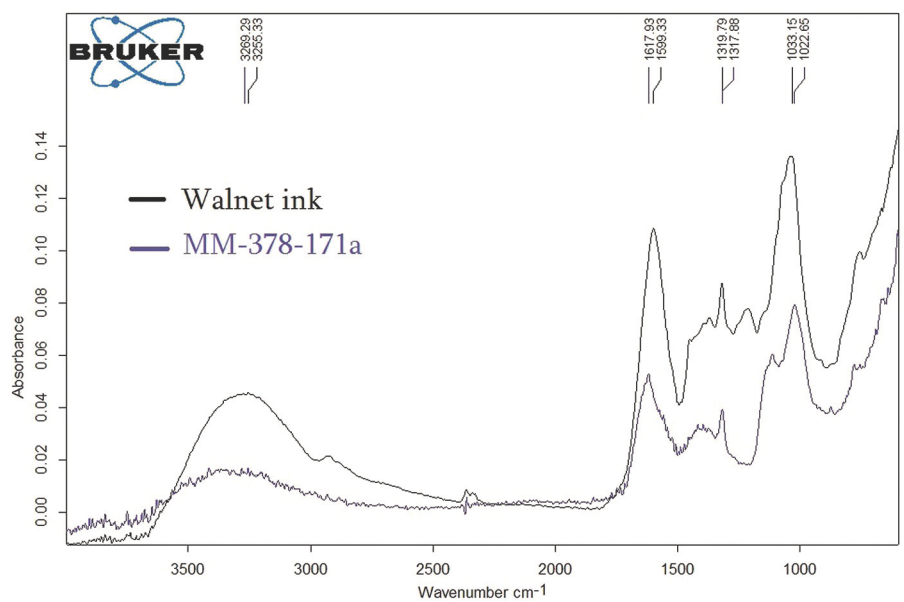
⁵¹ ELIAZIAN 2009: 137–170; ENGEL & ELIAZIAN 2006: 94–112.

⁵² DERRICK & STULIK & LANDLY 1999; CENTENO & GUZMAN & KLEPS & DELLA DELLA VÉDOVA 2004: 139–150.

⁵³ International Raman Users Group (IRUG). URL://www.irug.org.



Pl. 1: FTIR-ATR Spectroscopy, XRF Spectroscopy and Dino-Lite Microscope setups

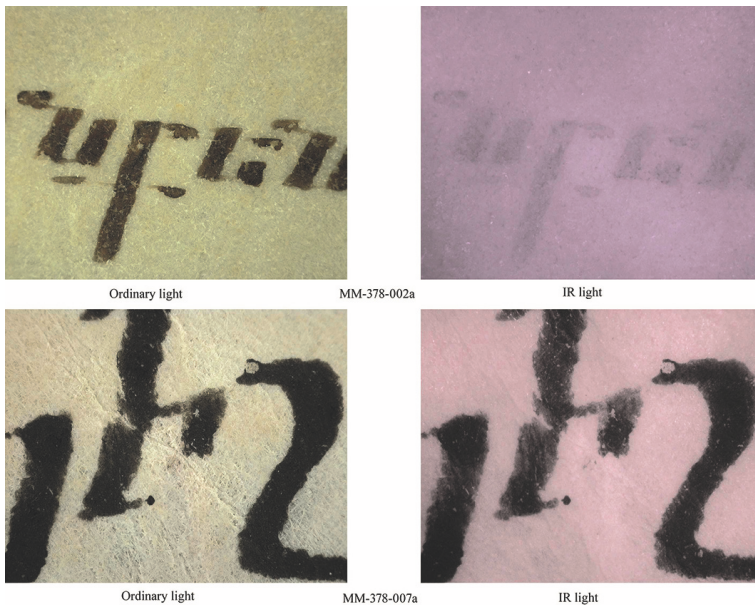


Pl. 2: IR spectrum of walnut ink

Black ink

Analysis of historical inks, particularly walnut and carbon-based varieties, reveals distinct compositional properties. Research conducted by our institute's chemists demonstrates that walnut ink, synthesized from Armenian walnut,⁵⁴ exhibits unique spectral characteristics (Pl. 2). Notably, its infrared (IR) spectrum displays a distinctive absorption peak at 1317 cm^{-1} (Pl. 3) serving as a diagnostic marker.

Further investigation of colophons (inscriptions) across manuscripts indicates that approximately 90% were penned using charcoal-based inks. Comparative IR imaging highlights a key difference: walnut ink exhibits partial absorption under IR light, whereas carbon-based ink is fully absorbed.⁵⁵ This contrast enables precise differentiation between the two ink types in multispectral analysis.



Pl. 3: Visual comparison of walnut and carbon inks under ordinary and IR light (samples MM-378-002a, MM-378-007a)

⁵⁴ KHOROZIAN & ELIAZAN 2021, 421–533

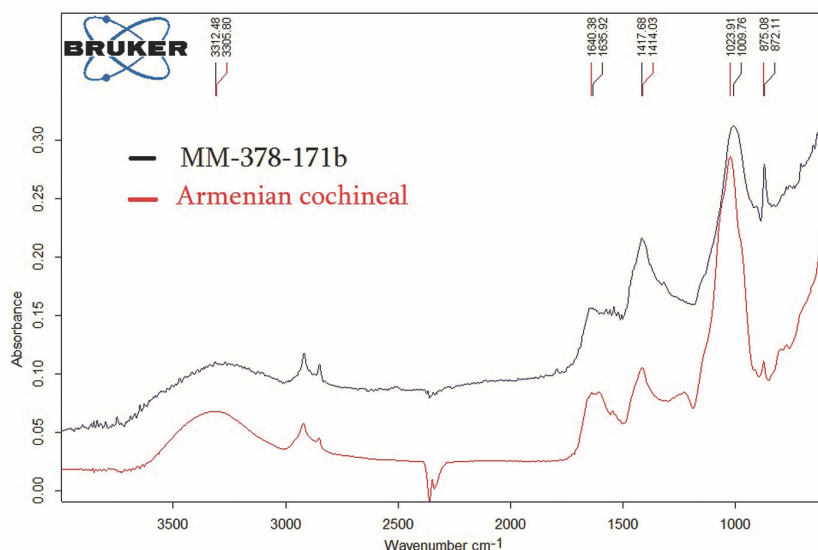
⁵⁵ ELIAZAN 2009, 137–170; ENGEL & ELIAZAN 2006, 94–112; LAU W.S. 1999.

Red Ink and Pigment Derived from Armenian Cochineal



Pl. 4 (MM-378-007b)

Armenian cochineal utilized as a red ink and coloring agent (see Pl. 5).



Pl. 5: Infrared (IR) spectrum of Armenian cochineal

Spectral Analysis Results:

- **Chemical Identification:** 3, 5, 6, 8-tetrahydroxy-1-methyl-9, 10-dioxo-7-[3, 4, 5-trihydroxy-6-(hydroxymethyl)oxan-2-yl]anthracene-2-carboxylic acid.

- **Key Spectral Peaks:**

- **872 cm⁻¹:** Deformation vibration of CH groups.
- **1009 cm⁻¹:** Stretching vibration of C-O groups.
- **1300–1414 cm⁻¹:** Deformation vibration of CH₂ and CH₃ groups.
- **1635 cm⁻¹:** Absorption band corresponding to anthracene double bonds. (MM-378-171b).

Blue Pigment

The blue pigment observed across all manuscripts was identified as ultramarine blue (Na₇Al₆Si₆O₂₄S₃). This determination was supported by spectral analysis⁵⁶ (Pl. 6).

⁵⁶ DERRICK & STULIK & LANDLY 1999, 43–79; CHUKANOV & SAPOZHNIKOV & SHENDKIR & VIGASINA & STEUDEL 2020: 1–24.



Pl. 6: MM-378-009b

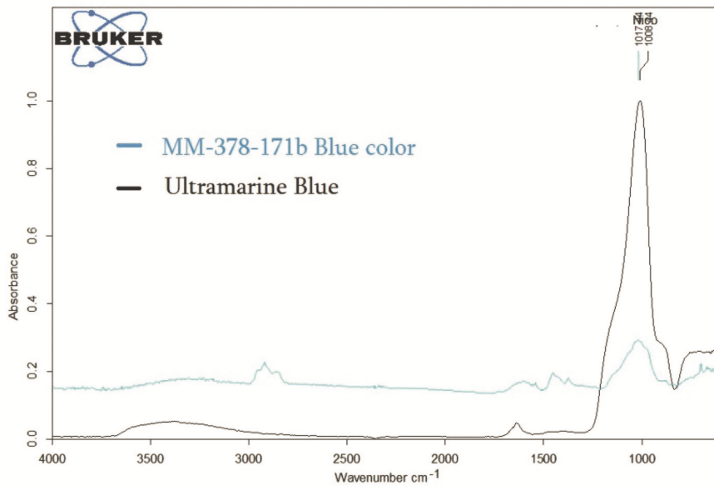
Infrared Spectroscopy (IR) spectrum analysis:

The IR spectrum of the blue pigment (Pl. 7) exhibited a characteristic absorption band in the range of $1005\text{--}1022\text{ cm}^{-1}$, corresponding to the Si-O-Si stretching vibration.

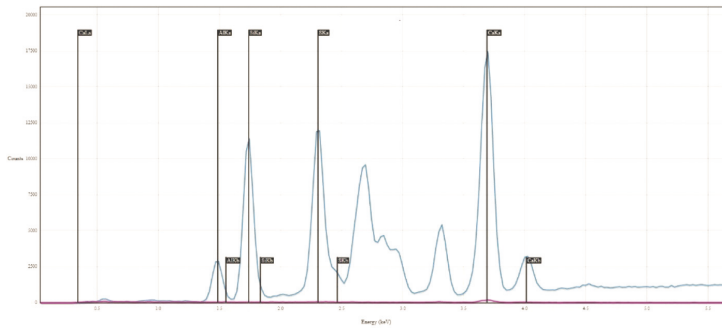
X-Ray Fluorescence (XRF):

XRF analysis of sample MM-378-171b (Pl. 8) confirmed the presence of aluminum (Al), silicon (Si), and sulfur (S), which align with the elemental composition of ultramarine blue.

These findings collectively confirm the use of ultramarine blue pigment in the manuscripts.



Pl. 7: IR spectrum Ultramarine blue



Pl. 8: XRF spectrum MM-378-171b Blue color

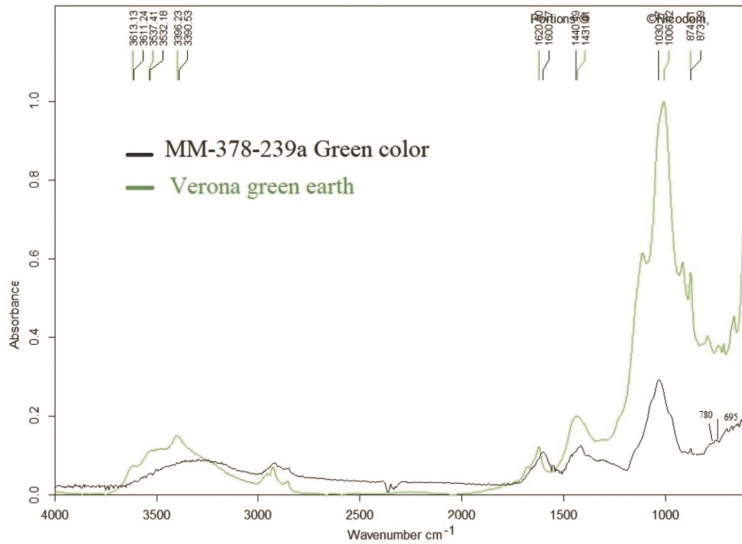
Green Pigment

The green pigment Verona green earth, with the chemical formula $\{K(Al,Fe^{3+})(Fe^{2+},Mg)(AlSi_3Si_4)O_{10}(OH)_2\}$, was analyzed using spectroscopic techniques⁵⁷ (Pl. 9).



Pl. 9: MM-378-005a

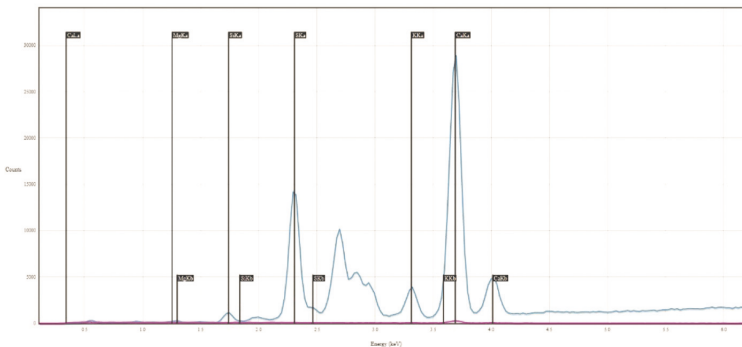
⁵⁷ OSPITALI & BERSANI & DI LONARDO & LOTTICI 2008: 1066–1073.



Pl. 10: IR spectrum Verona green earth

Infrared (IR) Spectrum Analysis (Pl. 10):

- Hydroxyl groups: Peaks at **3613 cm⁻¹** and **3390 cm⁻¹** (stretching vibrations) and **1600 cm⁻¹** (bending vibrations).
- Silicate structure: Strong Si-O stretching bands at **1108 cm⁻¹**, **1030 cm⁻¹**, and **980 cm⁻¹**.
- Additional vibrations: R-O-H bending modes at **780 cm⁻¹**, **751 cm⁻¹**, and **695 cm⁻¹**¹⁷.



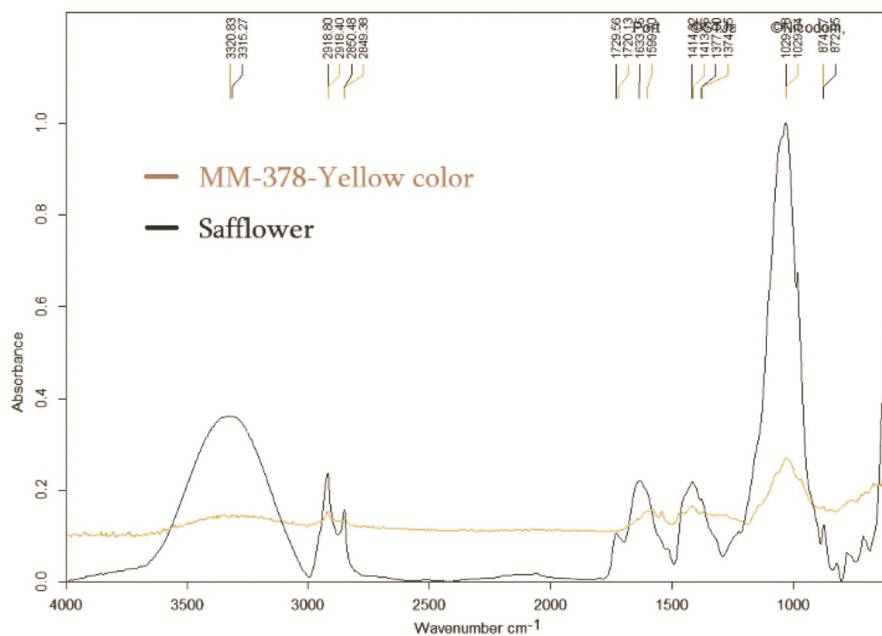
Pl. 11: XRF spectrum MM-378-239a Green color

XRF Analysis (Pl. 11)

The XRF spectrum confirmed the presence of **Mg**, **Si**, and **K** elements, aligning with the compositional formula of Verona green earth.

Yellow Pigment: Safflower (*Carthamus tinctorius*) – $C_{43}H_{44}O_{24}$ 

Pl. 12: MM-378-259a



Pl. 13: IR Spectrum of Safflower

The spectral analysis yielded the following results:

- **1029 cm⁻¹**: Stretching vibrations of C-O groups.
- **1413 cm⁻¹**: Deformation vibrations of CH₂ and CH₃ groups.
- **1599 cm⁻¹**: Bending mode of H-O-H in water molecules.
- **2849–2918 cm⁻¹**: C-H stretching vibrations of hydrocarbon bonds.
- **3500–3200 cm⁻¹**: Stretching vibrations of hydroxyl (OH) groups in water and other compounds (as shown in Figure 13).

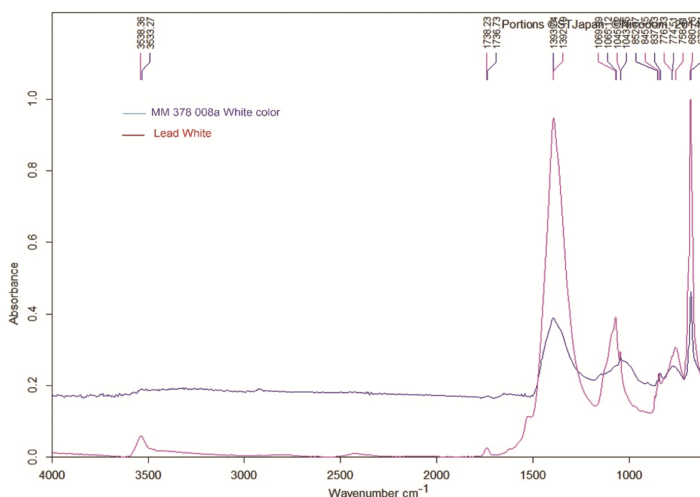
White Pigment (Lead White)

The examined white pigment was identified as lead white, with the chemical formula⁵⁸ $\{2\text{PbCO}_3.\text{Pb}(\text{OH})_2\}$

⁵⁸ WHITE 1974: 227–284.



Pl. 14: MM-378-008a

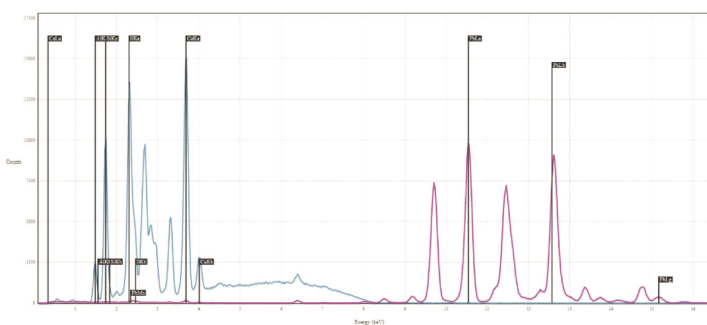


Pl. 15: IR spectrum Lead white MM-378-008a

Infrared (IR) Spectroscopy Results

The IR spectrum (Pl. 15) revealed characteristic bands associated with lead white:

- A strong absorption band at **1393 cm⁻¹**, attributed to the asymmetric stretching vibration of the carbonate (CO₃²⁻) group.
- Additional carbonate-related bands at **678 cm⁻¹** and **1043 cm⁻¹**.
- A hydroxyl (O-H) stretching band at **3533 cm⁻¹**, consistent with the presence of hydroxide groups in the compound.⁵⁹



X-ray Fluorescence (XRF) Analysis

XRF data (Pl. 16) confirmed the presence of **lead (Pb)** as the primary elemental component, aligning with the chemical composition of lead white. These findings substantiate the identification of the pigment as lead white based on its spectral and elemental characteristics.

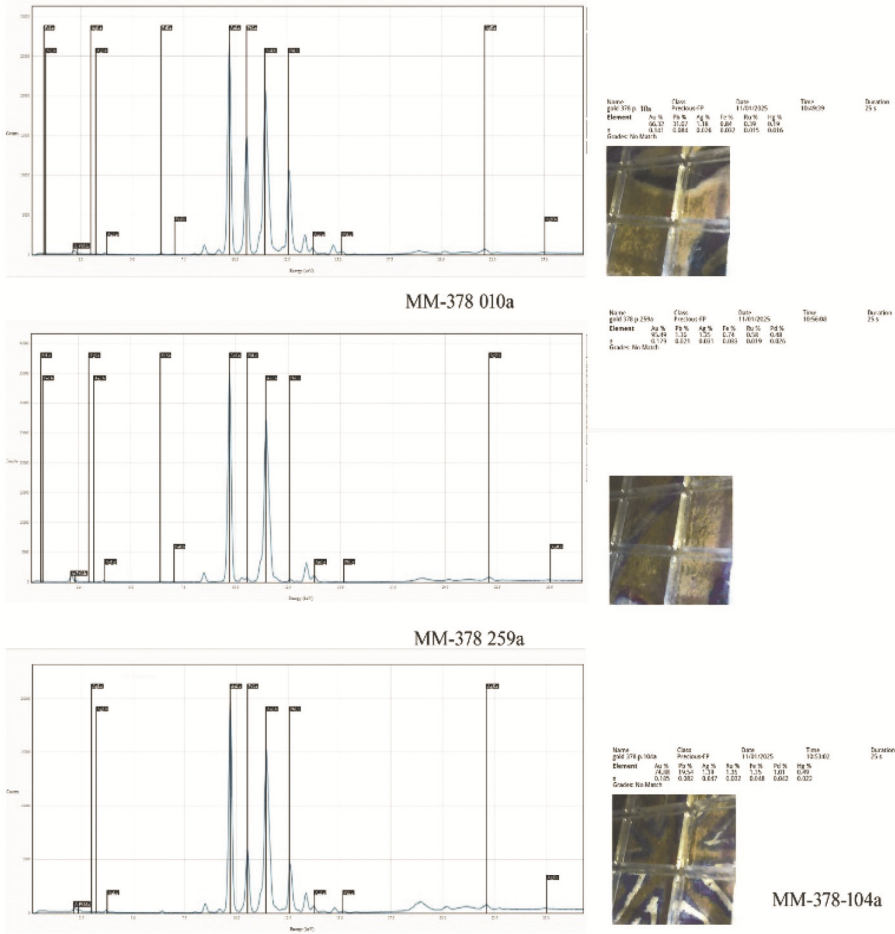
Gold Analysis across Three Pages

The gold content was examined using XRF (X-ray fluorescence) across the following manuscript pages:

- **Pages:** MM-378-010a, MM-378-259a, MM-378-104a



Pl. 17: MM-378-010a, 259a, 104a



Pl. 18: XRF results for MM-378-010a, 259a, 104a

XRF Analysis Results:

- **Page 010a:** 60% gold
- **Page 259a:** 95.5% gold
- **Page 104a:** 74.8% gold

Conclusion

The study of Ms. 378 confirms it as a valuable example of interdisciplinary analysis. Codicological observations reveal the high-quality material structure of the manuscript, while iconographic and stylistic studies reveal the symbolic layers of the miniature system. Source studies interpretations facilitate the reconstruction of the historical circumstances surrounding the creation and circulation of the manuscript.

The chemical and material analyses (XRF and FT-IR) indicate that the manuscript is written on high-quality parchment. The scribe used walnut ink and local pigments, as well as imported ingredients.⁶⁰ The use of miniature decorations made from high-purity gold suggests interaction of both local and international material environments.

The integration of codicological, iconographic, source and material analyses of Ms. 378 facilitates a comprehensive evaluation of the manuscript, which unveils both the characteristics of the artistic system and the scientific data concerning the material composition.

In this study Ms. 378 is examined as a comprehensive system for the first time. The innovative approach, which involves the utilisation of non-harmful chemical methods in conjunction with historical and artistic analyses, unveils hitherto concealed layers of the manuscript's material and artistic merits. This approach facilitates the placement of the manuscript not only within the Armenian medieval manuscript studies, but also within the broader context of international medieval manuscript studies.

The Gandzasar construction inscription and the Ms. 378 colophons concurrently function as complementary documents. The first concerns the construction process of the monastery and the self-awareness of the princely house, while the second presents the conditions of the manuscript's creation and the role of the recipients. Collectively, these elements constitute a comprehensive representation of the spiritual, political and cultural realities of Artsakh in the 13th c.

⁶⁰ KHOROZIAN & ELIAZIAN 2021: 421–533.

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