



BETWEEN TRADITION AND INNOVATION: AN INTERDISCIPLINARY APPROACH IN THE STUDY OF SEVENTEENTH-CENTURY ARMENIAN MANUSCRIPTS

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Master in Philology

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Between Tradition and Innovation: An Interdisciplinary Approach in the Study of Seventeenth-Century Armenian Manuscripts

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ABSTRACT

Illuminated manuscripts are among the most exquisite objects of cultural heritage. The captivating charm of their colors and the beauty of the illuminations invite the reader to absorb the visual and textual delights. The intricate structure of bookbinding and precious materials involved in the production of the manuscripts make them works of great complexity. As such, a detailed knowledge of the materials and techniques implemented in their making process is required to design a sustainable conservation, tailored to their needs.

For the first time, a group of Armenian illuminated manuscripts dated to the seventeenth century and housed in the Gulbenkian Museum in Lisbon were studied with an interdisciplinary approach. The codices studied were a Bible (LA 152) and three Gospel Books (LA 193, 216, 253). The spiritual, cultural, and political identity of Armenian communities is revealed in these codices. These were investigated with specific methodologies from the History of Art, History and Technology of Artistic Production, and Conservation Science. The understanding of tradition and innovation in the art of these manuscripts will allow the development of better strategies for the conservation of this precious heritage.

A comprehensive examination of the context and background of the Armenian manuscripts revealed entangled connections in their production, ownership, and further acquisition. These manuscripts represent a peculiar map of the last Armenian *scriptoria* within the networks of seventeenth-century Armenian trade communities of Constantinople, New Julfa, and Crimea, emphasizing the dynamic circulation of people, commodities, and ideas between these economically prospering centers. As a product of the period when printed books were widely in use, these handwritten and illuminated codices earned more significance. Their leather binding, uniform text, and brilliant colors applied in ornaments and full-page miniatures are evidence of the high mastery and tradition established in Armenian *scriptoria* over the centuries. The art of illuminations reflects the choices towards medieval Armenian art. At the same time, some miniatures reflect distinct inspiration sources for local artists and indicate the geography of Armenian global connections spanned between the West and the East, from the medieval to early modern period.

The study of the color paints at the molecular level and their state of conservation was central. In the first phase, this investigation focused on formulations based on cochineal dyes, the colors of which vary from translucent pink to purple, passing through various shades of red and carmine; these colors may have been used in the illuminations of Armenian manuscripts. Several texts were explored in search of lost know-how to prepare these colors based on Armenian cochineal (*Porphyrophora hamelii*), collected in distant lands of Ararat; these were compared with the colors obtained using the American cochineal (*Dactylopius coccus*). The historical Armenian recipes selected for reproduction reveal unique production methods that will pave the way for further discussion.

Material analyses were extended toward the complete characterization of paint and ink formulations of seventeenth-century Armenian manuscripts from the Gulbenkian collection. Technical examination has shown the use of a medieval palette based on inorganic pigments such as lapis lazuli, minium, vermilion, orpiment, indigo, two different greens (vergaut and malachite), lead white and carbon black. The very important reds and pinks are possibly based on carminic acid. In the first phase, the characterization was based on a multi-analytical approach: Fiber Optic Reflectance Spectroscopy in the visible (FORS), Raman microspectroscopy (μ Raman), and Energy Dispersive X-ray Fluorescence microspectroscopy (μ EDXRF). The characterization of organic pigments based on cochineal will be complemented by microspectrofluorimetry in the visible and Fourier Transform Infrared microspectroscopy (μ FTIR).

The luxurious palette of Gulbenkian's Armenian manuscripts reflects a profound relevance to medieval tradition rigorously maintained in the early modern *scriptoria* and proclaims the aesthetic choices of seventeenth-century Armenian diaspora elites.

Keywords: Armenian manuscripts, Gulbenkian Museum, illuminations, the art of diaspora, colophons, Armenian cochineal, organic reds, historical reconstructions, chemical characterization.

RESUMO

Os manuscritos iluminados são das mais magníficas obras do património cultural. O encanto das suas cores e a beleza das iluminuras convidam o leitor a deleitar-se com estas obras únicas. A intrincada estrutura de encadernação e os preciosos materiais usados na sua produção fazem destes manuscritos obras de grande complexidade. Como tal, é necessário um conhecimento detalhado dos materiais e técnicas usados para conceber uma conservação sustentável, feita à sua medida.

Pela primeira vez, um conjunto de manuscritos iluminados arménios datados do séc. XVII, conservados no Museu Gulbenkian, em Lisboa, foi estudado com uma abordagem interdisciplinar. Os códices estudados foram uma Bíblia (LA 152) e três Evangelários (LA 193, 216, 253). A identidade espiritual, cultural e política das comunidades arménias revela-se nestes códices. Estes foram investigados com metodologias específicas da História da Arte, História e Tecnologia da Produção Artística e Ciências da Conservação. Aprofundando os estudos da tradição e inovação desta arte, este conhecimento permitirá desenvolver melhores estratégias de conservação deste precioso património.

Estes manuscritos espelham um mapa peculiar dos últimos *scriptoria* arménios, circulando através das redes das comunidades comerciais arménias do século XVII em Constantinopla, Nova Julfa e Crimeia. O contexto e história dos manuscritos revelou conexões complexas, realçando a circulação de pessoas, mercadorias e identidades entre esses prósperos centros. Produzidos num período em que os livros impressos eram amplamente utilizados, estes códices iluminados adquirem um significado maior. A encadernação em couro, o texto uniforme e as cores magníficas aplicadas em ornamentos e miniaturas de página inteira são evidências de uma alta mestria e tradição estabelecidas nos *scriptoria* arménios ao longo dos séculos. A iluminura nestes códices reflete uma opção pela herança da arte da Arménia medieval. Ao mesmo tempo, alguns artistas buscam fontes de inspiração distintas, revelando

a complexa rede de conexões arménias entre o Ocidente e o Oriente, desde o período medieval até o início do período moderno.

Foram ainda estudadas as cores e seu estado de conservação, a nível molecular. Numa primeira fase, esta investigação centrou-se nas formulações à base dos corantes de cochonilha, cujas cores vão de um rosa translúcido a um púrpura passando por vários tons de vermelho e carmim; estas cores poderão ter sido utilizados nas iluminuras de manuscritos arménios. Exploraram-se diversos textos em busca de um saber fazer perdido para preparar estas cores à base de cochonilha arménia (*Porphyrophora hamelii*), colhida nas distantes terras de Ararat; estas foram comparadas com as cores obtidas usando a cochonilha americana (*Dactylopius coccus*). As receitas históricas arménias selecionadas revelam modos de produção únicos que abrirão caminho a uma discussão mais aprofundada.

As análises, a nível molecular, foram alargadas à caracterização completa de formulações de tintas e corantes dos quatro códices arménios da coleção Gulbenkian. Esta revelou uma paleta medieval baseada em pigmentos inorgânicos como lápis-lazúli, mónio, vermelhão, ouropigmento, índigo, dois verdes (vergaut e malaquita), branco de chumbo e negro de carbono. Os importantes carmins e rosas são possivelmente baseados em ácido carmínico. Numa primeira fase, a sua caracterização baseou-se numa abordagem multianalítica: Espectroscopia de Reflectância por Fibra Óptica no visível (FORS), microespectroscopia de Raman (μ Raman) e microespectroscopia por Fluorescência de Raios-X Dispersiva de Energias (μ EDXRF). A caracterização dos pigmentos orgânicos à base de cochonilha será complementada por microespectrofluorimetria no visível e microespectroscopia de Infravermelho por Transformada de Fourier (μ FTIR).

A luxuosa paleta de manuscritos armênios da Gulbenkian refletindo a relevância da tradição medieval que foi mantida nos *scriptoria* do período moderno, revelando as escolhas estéticas das elites da diáspora arménia do século XVII.

Palavras chave: manuscritos arménios, Museu Gulbenkian, iluminuras, arte da diáspora, colofões, cochonilha arménia, vermelhos orgânicos, reconstruções históricas, caracterização química.

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SYMBOLS AND ACRONYMS

DCR FCT NOVA	Department of Conservation and Restoration of the Faculty of Sciences and Technology, NOVA University of Lisbon
μEDXRF	Energy Dispersive X-ray Fluorescence microspectroscopy
f./ff.	folio/folios
FCSH NOVA	Faculty of Social and Human Sciences, NOVA University of Lisbon
FORS	Fiber Optics Reflectance Spectroscopy
μFTIR	Fourier Transform Infrared microspectroscopy
HPLC	High Performance Liquid Chromatography
IEM	Institute of Medieval Studies of the Faculty of Social and Human Sciences, NOVA University of Lisbon
MS/MSS	manuscript/manuscripts
p./pp.	page/pages
μRaman	Raman microspectroscopy
r	recto
UV-Vis	Ultraviolet-visible
v	verso

ACRONYMS FOR MANUSCRIPT COLLECTIONS

Arsenal	Bibliothèque de l' Arsenal, Paris
Beirut	Arisdaghesian Collection (private), Beirut
British	The British Library, London
Dijon	Bibliothèque Municipale de Dijon, Dijon
Freer	The Freer Gallery of Art, Washington, D. C.
Getty	The J. Paul Getty Museum, Los Angeles
Isfahan	All Savior Armenian Cathedral and Library, Isfahan
Jerusalem	St. James of Jerusalem, Armenian Patriarchate Library, Jerusalem
Laurenziana	Biblioteca Medicea Laurenziana, Florence
Lisbon	Museu Calouste Gulbenkian, Lisbon
Matenadaran	The Mesrop Mashtots Institute of Ancient Manuscripts, Yerevan
Morgan	The Pierpont Morgan Library & Museum, New York
Moulins	Bibliothèque Municipale de Moulins, Moulins
Paris	Bibliothèque Nationale de France, Paris
Porto	Biblioteca Pública Municipal do Porto, Porto
Topkapi	The Topkapi Palace Museum, Istanbul
Tournai	Bibliothèque du Séminaire Episcopal, Tournai
Vatican	Biblioteca Vaticana, Vatican
Venice	The Mekhitarist Library of San Lazzaro Congregation, Venice
Walters	The Walters Art Museum, Baltimore, Maryland

TRANSLITERATION SYSTEM FOR ARMENIAN ALPHABET

Ա ա		Ա a	Յ յ		Կ կ
Բ բ		Բ b	Ն ն		Ն n
Գ գ		Գ g	Շ շ		Տ տ
Դ դ		Դ d	Ո ո		Օ օ
Ե ե		Ե e	Չ չ		Շ՝ շ՝
Զ զ		Զ z	Պ պ		Ք ք
Է է		Է ē	Ջ յ		Դ՛ յ՛
Ը ը		Ը ě	Ռ ռ		Ր՛ ի՛
Թ թ		Թ t	Ս ս		Տ ս
Ժ ժ		Չ չ	Վ վ		Վ v
Ի ի		Ի i	Տ տ		Թ t
Լ լ		Լ l	Ր ռ		Ր r
Խ խ		Մ m	Յ յ		Շ՝ c՝
Օ օ		Շ շ	Ի ի		Վ w
Վ վ		Կ կ	Փ փ		Ք՝ p՝
Հ հ		Ի հ	Ք ք		Կ՝ k՝
Ձ ձ		Ե յ	Օ օ		Օ օ
Ղ ղ		Լ ի	Ֆ ֆ		Բ f
Ճ ճ		Շ շ	Ո ո		Ս u
Մ մ		Մ m			



CHAPTER 1

Detail, bird-ornament, LA 253, f. 19v

1. GENERAL INTRODUCTION

This chapter is designated upon the original idea that served as a stimulus for the initiation of this doctoral project - the comprehensive study of a collection of Armenian illuminated manuscripts. This general introduction does not aim at providing a detailed history of all the aspects of Armenian manuscripts, as this was already accomplished much better by the field experts [1-7]. Within a more modest framework, the purpose of the present introduction is to serve as a means of cognition for those who would have their first encounter with the domain of Armenian manuscript culture.

The chapter starts with a general introduction to the basic aspects of the history of Armenian manuscripts, with a purpose to contextualize and facilitate the reception of these heritage objects by a general audience. This theoretical background expands into specificities of Armenian manuscripts, different schools of illumination, relevant studies in the field, and the present state of the art. In the following section of this chapter, the selected study material, together with the main aim and objectives are presented. The chapter discusses the importance of interdisciplinarity and carefully selected approaches in such case studies. Furtherly, the chosen methodology is summarized in three respective points: (a) Art History; (b) Art Technology; and (c) Art Chemistry.

1.1. Armenian Manuscript Tradition

Illuminated manuscripts are eloquent evidence of the artistic richness of a given culture. They reflect several aspects, such as the perception of literacy, art, and aesthetics, as well as the established practices in art and craftsmanship. In a wider scope, they provide a perspective on cross-cultural connections, inspirations, influences, social and religious concepts, economic power, political circumstances, and human potential.

Manuscripts constitute one of the main pillars of the Armenian cultural heritage, as evidenced by their apparent abundance compared to other art domains [8]. Since the very beginning, in the Armenian worldview, the manuscript obtained a wider than textbook significance. It was an object for devotion, a precious and unattainable treasure affordable to few, a gate leading to remembrance, redemption, and salvation. In local popular beliefs, the manuscript was the saint, healer, and guardian of families and human beings in general. And it continues to be so. The production of a manuscript was perceived by a similar philosophy. To copy the text or to embellish it with illuminations was a grant for the scribes and artists, prayer and meditation, an action leading to self-purification. For the patrons, to commission a manuscript and to be remembered on its sacred pages was the blessing and greatest desire, an act of safeguarding their way to heaven.

It was due to the early Armenian scriptures that language, history, and manuscript tradition were passed down from generation to generation. Due to the skills and craftsmanship of the ancients, these scriptures obtained their precious materiality, expressed in the form of a codex. And due to an exquisite performance of the manuscript illuminations, Armenian art received its most sophisticated expressions and secured its place in the world's artistic heritage.

1.1.1. Chronology, Geography, and History

Since the year 405 AD, when the scholar and cleric Mesrop Maštoc' invented the Armenian alphabet, literary and educational activities have been developed in the Armenian milieu. According to Koryown (fifth century), a disciple of Mesrop Maštoc', schools were established, where the new alphabet was being taught. The scribal activities were also initiated vigorously. The works of that period were dominantly translations of Sacred Scriptures from Classical Greek and Syriac into Classical Armenian, known as *Grabar*. One of the first works translated into Armenian was the Holy Bible, and the first phrase of it from the Book of Proverbs (1:2-3): "To know wisdom and instruction; To perceive the words of

understanding". This phrase became a reference to the Armenian written heritage to this day [9-11].

One may imagine the evolving scribal practices during the classical and early medieval periods for Armenian written culture, attested not only in early translations, but also in scholarly works encompassing history, philosophy, poetry, medicine, astrology, geography, and law. This period lays its ground on fundamental works of early authors such as Agat'angelos (fifth-century historian), Koryown (fourth-fifth-century historian, teacher, translator), Eliše (fifth-century historian), Eznik Kołbac'i (fifth-century translator, theologian, philosopher), Movses Xorenac'i (fifth-century historian), Łazar P'arpec'i (fifth-sixth-century historian), P'avstos Bowzand (fifth-century historian), and extends upon the works of later scholars [10:17]. However, this formative period lacks information regarding Armenian manuscript production.

The only preserved fragments of early medieval Armenian manuscripts, that are mainly dated paleographically, may be found within the single preserved fragments and palimpsests usually found in the binding structure of the manuscripts. These early fragments, roughly dated to the ninth to tenth centuries, are mentioned in the descriptions of the manuscripts they make part of, traceable in the General Catalogue of Matenadaran [12-13, 11:52, 1:25-30].

The earliest preserved four illuminated pages, dated to the sixth to seventh centuries, were found in a tenth-century Armenian Gospel (Ėjmiacin Gospels, Matenadaran MS 2374), to which they were bound posteriorly. The earliest complete and dated Armenian manuscripts are known to be the Gospels from 862 AD (Queen Mk'e Gospels, Venice MS 1144/86) and 887 AD (Łazaryan Gospels, Matenadaran MS 6200) [14, 11, 4:157-172].

From the tenth century onwards, there is a constant record of dated Armenian manuscripts, up to the nineteenth century. A study dedicated to the statistics of dated Armenian manuscripts indicates the continuity of Armenian manuscript tradition with fluctuating production periods, on which the late-fourteenth and mid-sixteenth centuries seem to be the lowest ones, while the seventeenth century represents the highest productive period [15]. The emergence of all this written heritage is dispersed throughout specific periods and environments, greatly shaped by the historical circumstances of Armenian reality (Figure 1, Table 1). Disentanglement of this process sometimes appears to be confusing, given the huge number of Armenian manuscripts produced. However, the attribution of these manuscripts to several schools of illumination or *scriptoria* will help to better understand and orderly trace the history of Armenian manuscript production.

Table 1. Table showing the historical time-lapse (fifth to eighteenth centuries) of Armenian written heritage, followed by a brief overview of foreign dominations in the vicinity and over Armenian territories for a given period [16-17].

Centuries V-VI	The invention of the Armenian alphabet (405 AD) and early literary developments <i>Historical environment:</i> Marzpanate Armenia (Armenian noble families) <i>Region:</i> Byzantine and Sasanian Empires
Centuries VI-VIII	Early medieval literary developments <i>Historical environment:</i> Marzpanate Armenia (Armenian noble families) <i>Region:</i> Arrival of Arabs; Byzantine-Arab wars
Centuries IX-XI	The classical phase of Armenian manuscript art <i>Historical environment:</i> Medieval Kingdoms of Bagratid and Artzruni dynasties) <i>Region:</i> Arrival of Seljuks
Centuries XII-XIV	Golden Age of Armenian manuscript art <i>Historical environment:</i> Armenian Kingdom of Cilicia <i>Region:</i> Arrival of Egyptian Mamluks
Centuries XIV-XVI	The decline of Armenian manuscript art <i>Historical environment:</i> Foreign dominations <i>Region:</i> Arrival of Mongols and Turkoman tribes
Centuries XVI-XVIII	Diaspora-based Armenian manuscript art and early print houses <i>Historical environment:</i> Foreign dominations <i>Region:</i> Ottoman and Safavid Empires

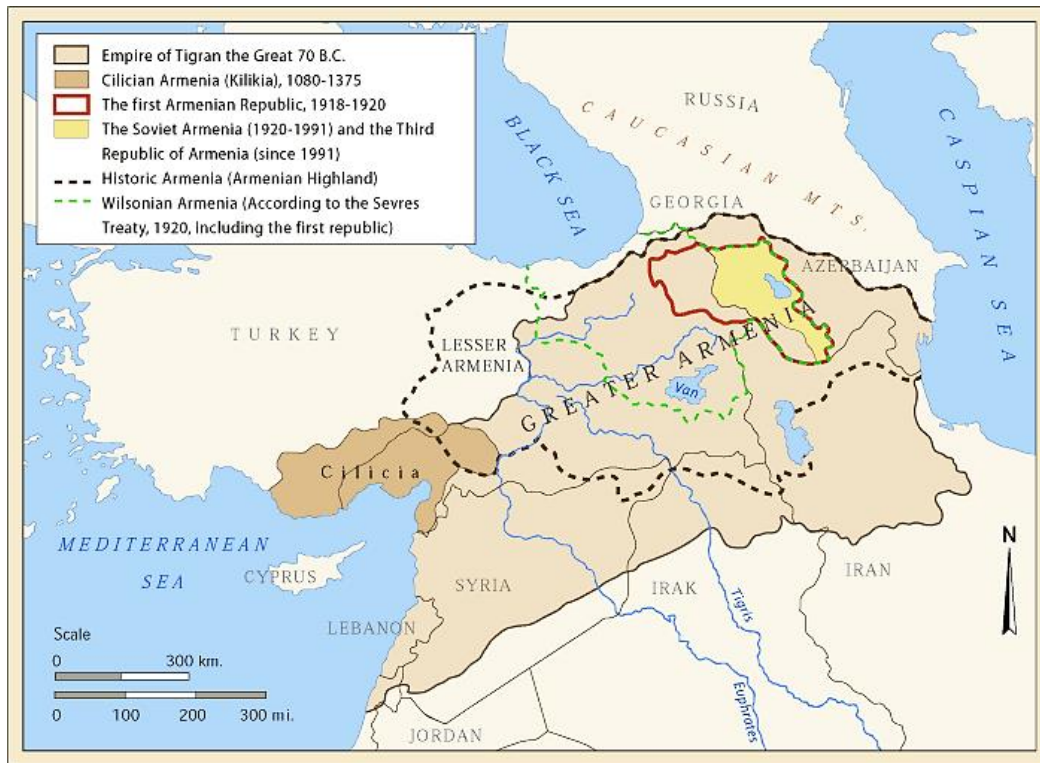


Figure 1. Map showing the historical Armenian territories from Roman times to the present day.
Map: © Armenica.org

1.1.2. Schools of Illumination

The Armenian manuscript tradition was developed in several schools of illumination or *scriptoria*, established in geographies where the Armenian presence was attested during different historical periods, conditioned by the rise and fall of Armenian Kingdoms or principalities, by the foreign dominations, forced migrations, or trade activities. In today's scholarship, these schools of illumination are mostly referred to by the names that reflect their connection with a specific geographical area, though each area might include numerous centers of manuscript production. Most of these centers were closely related to local churches and monasteries, while some were receiving royal patronage [18-20, 11:54].

The miniature art of each Armenian school is unique and distinctive, ranging from strongly refined to simply naive styles. However, one should notice the transmission of local elements from one school to another, induced by the mobility of Armenian people throughout the centuries. The crucial role of Armenian geography should be considered as well. The interrelationship with Eastern Christian manuscript cultures such as Syriac and Coptic, cultural contacts expanding towards Byzantium and the Latin West, along with regional proximity to Muslim cultures, generated a quite sophisticated and eclectic manuscript art

within Armenian tradition. To better understand its complexity and diversity, numerous manuscript centers should be considered.

Below we introduce the Armenian schools of illumination by ascending chronology, which is rather generic because it only represents the most prosperous periods for each school; many of them started or continued to work during a wide range of periods, albeit more sporadically.

Melitene (centuries XI-XIII)

An early group of Armenian manuscripts, known as the Melitene group, originates from Melitene (Malatya, present-day Turkey). Armenians appeared in this part of Eastern Anatolia already from Byzantine times. At the beginning of the eleventh century, a large number of Armenians resettled here, specifically after the fall of Ani (1064), the capital city of the Bagratid Kingdom, into Seljuk's hands.

Melitene manuscripts are all Gospel Books, mostly dated to the eleventh century, and represent one of the earliest known illuminated examples of Armenian manuscript art, before the Cilician period. They were probably produced in a monastic environment. The art of these manuscripts is familiar to that of their neighboring traditions such as Byzantine and particularly the Cappadocian art. They represent a complete cycle of the life of Christ, traditionally proceeding the Canon Tables in the Armenian Gospel Books. The full-page miniatures of these Gospels present a simple, somewhat naive style of painting. However, the style and other specificities of these manuscripts are yet to be studied [21-22].

Kars and Ani (centuries XI-XIII)

The schools of illumination of Kars and Ani were developed under the patronage of medieval Armenian Kingdoms (884-1065) headed by the Bagratid and Artzruni dynasties. This period is considered as a classical phase for Armenian miniature art thriving mostly in urban environments, and being fostered by royalty, clerics, and noble families. Arts and crafts were flourishing in the medieval Armenian capital cities of Kars (929–961) and Ani (961–1045), together with an emerging impressive architecture. This prospering environment served as an impetus for local *scriptoria*, which offered some of its unique examples of manuscript art. Sumptuously illuminated manuscripts were luxury objects of this time, affordable only to the elites of society. Together with a strong religious character, the manuscript imagery of this period reflects some features of secular art, inspired by the vibrant reality of human interactions and smoothly infused into miniature art [23-26]. This medieval prosperity was

interrupted by Seljuk invasions intruding from Central Asia at the beginning of the eleventh century.

Cilicia (centuries XII-XIV)

After the surrender of the Eastern and Western parts of the Armenian Kingdom to Byzantium and Seljuk powers, the wave of Armenian migrations started towards Crimea and Eastern Europe. A group of noble families, fleeing the Seljuk invasion, established in the Cilicia region northwest of the Gulf of Alexandretta, where in a short period a new kingdom was raised, known as the Armenian Kingdom of Cilicia (mentioned also as Little Armenia or Lesser Armenia in historical sources). The strategy of this Kingdom was Latin-oriented. Being geographically well localized and having access to the Mediterranean Sea by its port Ayas, Cilicia was involved in the active trade networks. The Cilician monarchy was establishing contacts with Latin, Byzantine, and Muslim worlds, exchanging influences at all societal levels, including artistic production.

This period is known for the most sophisticated examples of Armenian manuscript art. The *scriptoria* established in Cilician monasteries were privileged by the royal families. Under their patronage, the most luxurious and affluent manuscripts were produced. The scribes and illuminators could use the best materials of their time. Cilician manuscript art is impeccable in its expressive forms and mastery of performance. It reflects the tight contacts Armenians had with their Latin counterparts, and deeply individual characteristics at the same time. This prospering Kingdom had a few centuries of life and fell under the power of Egyptian Mamluks. The legacy of precious royal manuscripts, if not plundered and destroyed, was displaced together with Armenian people migrating to safer destinations [27-30].

Glajor and Tat'ew (centuries XIII-XIV)

During the Middle Ages, there were several schools of illumination developed in the region of Greater Armenia that overlaps with the territory of present-day Armenia to some extent. These schools were mostly operating within the monastic complexes, which were medieval scholarly centers, libraries, and *scriptoria* at the same time. Some of the notable schools were that of Gelard, Gošavank', Harī avank', Nôravank', Sewan, Sanahin, Haġpat, Glajor, and Tat'ew. The high reputation was granted to the schools of Glajor (thirteenth-fourteenth centuries) and Tat'ew (fourteenth-fifteenth centuries) located in the Southern Syownik' region of present-day Armenia and administrated by the monasteries of Glajor and Tat'ew respectively. These were medieval centers where students could receive instruction on rhetoric, philosophy, theology, and grammar, as well as calligraphy and illumination. During

this period, the Armenian *scriptoria* were dealing with harsh conditions due to devastating Mongol invasions. Despite that, the school of Glajor has provided a group of prominent artists who presented a unique style and vivid imagery. The school of Tat'ew continued the traditions of Glajor in the following centuries. This school also has provided several talented artists and examples of exquisite miniature art. Manuscript illuminations from these schools are known for their exceptional monumental style and deep colors [31-34].

Arc'ax (centuries XIII-XIV)

Arc'ax, a mountainous region in the Eastern part of present-day Armenia, and once a tenth region of Greater Armenia, is known for its numerous *scriptoria* mostly administrated by local churches and monasteries. Art and architecture have been flourishing here since early medieval times. Although Muslim invasions devastated the prospering centers of Armenian art in Arc'ax, however, several unique manuscript exemplars have survived to our day. The style of this school reflects the affinity towards folk art, within the individual original approaches implemented by the artists. The clear lines, distinct forms, and architectural framings render a specific beauty of Arc'ax's miniatures [35-37, 11:55].

Vaspowrakan (centuries XIV-XVI)

The school of Vaspowrakan is composed of numerous Armenian *scriptoria* located in the historical region of Greater Armenia, in the surroundings of Lake Van. Manuscript production in Vaspowrakan flourished during the fourteenth-sixteenth centuries, thus surviving the continuous invasions of Mongol and Turkic dynasties. Most of the scriptorial centers of this school were connected to local Armenian churches or monasteries. Van region was greatly productive in terms of artistic legacy, offering a wealth of manuscripts and generations of scribes and artists. Due to a vast number of workshops, Vaspowrakan manuscripts represent a vivid diversity of individual artistic styles and approaches [38-39, 11:55].

However, the fifteenth-sixteenth centuries were dark years for Armenian history, and therefore for Armenian art. The fall of Constantinople in 1453 re-established new regulations in the region. At the beginning of the sixteenth century, Armenia was split apart between newly emerged powers of that time, the Ottoman, and Safavid Empires. Continuous conflicts between Muslim neighbors caused a new wave of migrations of Armenian people. This was a period of decline in Armenian manuscript production, which, surprisingly, has found its revival in destinations other than historical Armenia [40].

Diaspora (centuries XVII-XVIII)

At the beginning of the seventeenth century, the newly emerged merchant class of mostly displaced Armenians played a key role in the promotion of Armenian art. Three main centers of merchant communities, where manuscript production was thriving, were Constantinople, Crimea, and New Julfa (Isfahan) [41-42].

These communities were amazingly resolute in the preservation of their language and culture, perhaps without even realizing it. Their spontaneous apprehension led them to foster Armenian art and architecture in remote geographies. Despite being well acquainted with contemporary artistic trends of the time, the seventeenth-century Armenian elites have turned their gaze towards the past. Their traditional choices were reflected, for instance, in their preference for manuscripts over printed books. The seventeenth century is considered one of the most productive periods for Armenian manuscript art, with particular emphasis on the execution of Bible and Gospel manuscripts.

However, the new technologies of that time were not far behind. The first printing houses were implemented in Armenian diasporas, with the first Armenian book being printed in Venice, in 1512. In the next centuries, several Armenian books were printed also in Rome, Milan, Amsterdam, Marseilles, Paris, Lviv, Athens, Smyrna, Constantinople, Êjmiacin, and other cities. It is important to mention that even after these printing attempts, the manuscripts were still being copied and illuminated by hand. This fascinating coexistence of two different forms of book production lasted up to the nineteenth century [43-44].

The miniature art of the Armenian diasporas is quite eclectic. It conjoins both traditional and novel inspirations. Regarding traditions, it has been mentioned that the Constantinopolitan *scriptoria* has much relevance to that of Cilician Armenia, while the New Julfan *scriptoria* to Vaspurakan [45]. With this, these *scriptoria* receive and adopt many Western inspirations originating from both medieval Latin art and early modern printed book cultures [46]. The Crimean *scriptoria* deeply refer to medieval Armenian art as well, maintaining at the same time its Westernized features obtained from the close links with Latins yet in the fourteenth century [47-49]. Apart from local and external connections, these last Armenian *scriptoria* were rather linked to each other within their exchange of artistic forms and expertise in manuscript production [50].

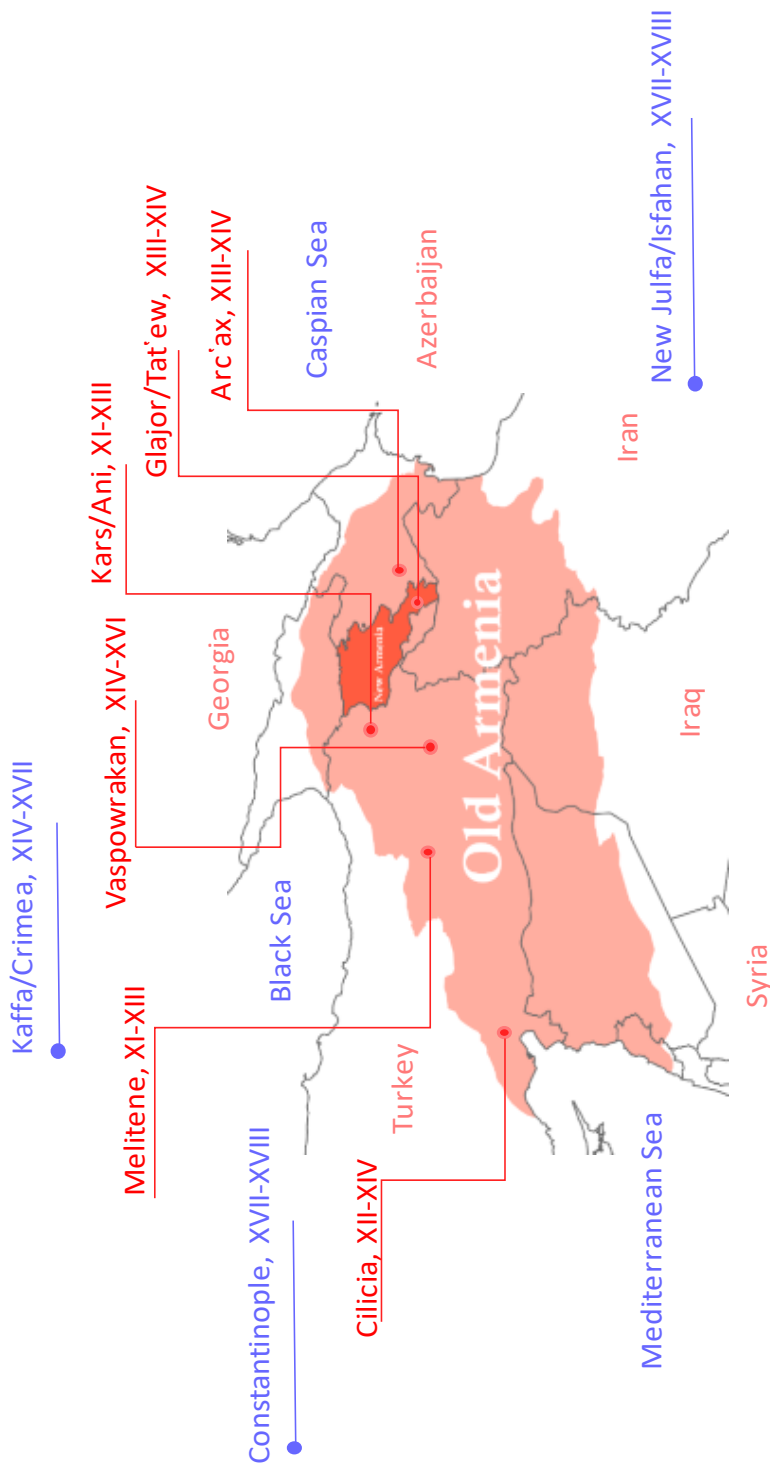
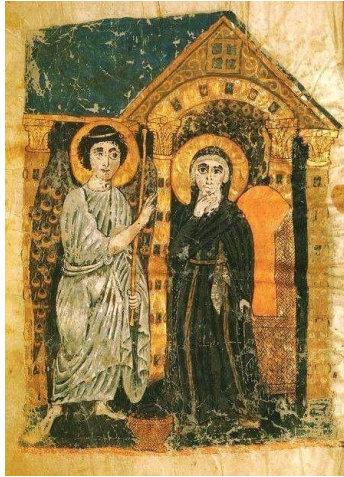


Figure 2. Map of the main Armenian schools of illumination developed in the Armenian-populated areas once considered as part of the Armenian domain (principality, kingdom, statehood) (red points) and in the areas of the foreign domain (blue points).

Map: © cartoma-hamelberg.com



Ējmiacin Gospels, 989
Noravank', Syownik'
MS 2374, Matenadaran



T'argmanc'ac' Gospels, 1232
Northern Armenia,
MS 2743, Matenadaran



Gospel Book, 1280
Hromkla, Cilicia
MS 9422, Matenadaran



Gospel Book, 1297
Tat'ew Monastery
MS 7482, Matenadaran



Gospel Book, 1330
Village of Urunkar
MS 2929, Matenadaran



Gospel Book, 1356
Sowrxat', Crimea
MS 7408, Matenadaran



Gospel Book, 14th century
Arc'ax, Armenia
MS 316, Matenadaran



Gospel Book, 14th century
Syownik', Armenia
MS 6305, Matenadaran



Gospel Book, 17th century
Constantinople
MS W.546, Walters

Figure 3. The theme of Annunciation as represented in the Armenian manuscripts from different schools of illumination and historical periods. More images can be found at [51].

1.1.3. Dating Issue and Colophons

The majority of Armenian manuscripts preserve their original colophons which are notations left by scribes when they complete the work and usually provide information on the date, place, scribe, artist, and patron of the manuscript. Thanks to these colophons, most of Armenian manuscripts can be easily dated. Colophons play an important role in the reconstruction of past trajectories and events related to manuscripts. They can be of distinct typologies and extents. Colophons in Armenian manuscripts are generally lengthy and detailed. However, there are abundant concise examples as well. Together with names related to the execution of the manuscript, these colophons also contain extensive praising passages and detailed descriptions of historical events for a given time. Therefore, much information can be extracted from these texts that seem to be eloquent witnesses of the past. Despite the generic patterns of the Armenian colophons, they are exclusively individual compositions and may vary depending on their style. Over time, some of these colophons obtained the value of a literary work and were copied repeatedly in several manuscripts. Armenian colophons received significant scholarly attention [52-57].

In some other cases, when the colophon is not clear or is missing altogether, the dating of the manuscript is possible either by attributing the extant names to already known historical persons and places, or by further study of codicology, paleography, and iconography of the manuscript.

1.1.4. Content Categorization

The vast majority of Armenian manuscripts are of religious content, leaving a small percentage for that of secular ones. This fact has much to do with the early adoption of Christianity as a state religion (301 AD), which has defined a deep religious character of Armenian art, since the very beginning. The Sacred Scriptures were profusely copied in the monastic or royal *scriptoria*. The Bible and Gospel Books were particularly venerated and copiously commissioned. Other Liturgical books include the Lectionaries, Missals, Menologiums, Psalters, Collections of Sermons, Breviaries, Hymnals, Commentaries, and Rituals. Among these books, the highly appreciated ones were the Four Gospels, with a considerably high number of copied examples if compared to other religious texts copied in Armenian tradition. Non-religious content categories of Armenian texts include philosophy, grammar, poetry, chronicles of history, calendars, books on astrology, medicine, alchemy, miscellanea collections, merchant account books, and some less common subjects [58-59].

1.1.5. Present State of the Art

Nowadays, Armenian manuscripts are preserved in several institutions: museums, archives, and public and private libraries, in Armenia and worldwide. The largest repository of this precious heritage is the Matenadaran Institute of Ancient Manuscripts with around 11.000 complete manuscripts preserved. Other repositories include the Library of Armenian Mekhitarist Fathers in San Lazzaro, Venice, with roughly 4000 manuscripts, the Armenian Patriarchate of Jerusalem, again, with 4000 exemplars, the Library of Armenian Mekhitarist Fathers in Vienna, with 1200 manuscripts there, the Armenian Monastery of Bzommar in Lebanon with 1000 exemplars, Armenian Monastery of New Julfa, Isfahan, with around 1000 manuscripts. There are also smaller, yet important collections of Armenian manuscripts preserved in the collections of the United States, Europe, and the Middle East [7:38].

There is a huge scholarship dedicated to Armenian manuscripts. The most extensively explored areas belong to textual [60-61] and art historical studies [62-67]. In this respect, one may find a wealth of information with several noteworthy publications by renowned scholars. Significant work has been dedicated to the examination of several schools of illumination and manuscript production centers, resulting in the coherent establishment of certain artistic traditions [68-69, 47, 45, 38-39, 36, 26-27, 22, 20]. The codicology, paleography, and bookbinding, although little explored, have received substantial attention in several works that emphasize the importance of book archaeology and offer insights into Armenian codicology [70-71], paleography [71-74], bookbinding [75-82], and silver covers [83-85]. Less attention has been paid to the materiality of Armenian manuscripts, except for the studies carried out in the 80s-90s [86-89, 70:124-142] and more recent years [90-95], complemented with other contemporary ones [96-99]. Finally, the systematic work led by Matenadaran Institute on the creation of a wide range of catalogs of Armenian manuscripts extremely facilitates the research process. The major entry of the referred systematic work is the General Catalogue with its respective volumes, initiated in the early 60s and progressing up to now [100-101]. Apart from General Catalogue, there are several other thematic catalogs and compilations of uttermost importance, such as volumes dedicated to Armenian colophons [102-104], Armenian miniaturists [105], anonymous miniaturists [106], and so forth. All this scholarly inheritance is an important reserve for specialists in the field. However, illuminated manuscripts, being such complex objects, require continuous attention and updated research approaches. Considering the large number of extant Armenian manuscripts and the urge to preserve and present them in the best possible way, there is still much to do in this field.

1.2. Research Aspiration

The original idea of this project was a long-standing aspiration of the author to comprehensively examine a group of Armenian manuscripts, elucidate their material and immaterial features, and explore the history of scriptorial practices. The purpose was to study in detail all the aspects that comprise the textual, visual, and material complexity of an illuminated manuscript. The study then would be addressed to better preservation of such precious heritage. The implementation of this multi-aspect plan was carried out by a team composed of professionals from several disciplines of exact and human sciences. This fusion of expertise resulted in effective collaboration, and a wealth of knowledge obtained.

The material that became a physical nucleus for this study, upon which the objectives and methodology were constructed, represents a group of Armenian illuminated manuscripts composed of four exemplars and preserved in the Calouste Gulbenkian Museum, in Lisbon. The manuscripts, a Bible (LA 152) and three Gospels Books (LA 193, LA 216, LA 253), were kindly made available by the Museum authorities to be studied, for the first time, within an interdisciplinary approach.

1.3. Aim and Objectives

By addressing a holistic approach to a group of Armenian manuscripts produced in the seventeenth century, this study aimed to better understand the continuity of handwritten and illuminated book tradition during the early modern period in the given societal environments, by distinguishing traditional and novel practices implemented at certain *scriptoria* and reflected in the art, techniques, and materials of the manuscripts under the scope.

The objectives for this general aim include:

- a) Provision of a detailed physical description, together with the information regarding the content of the colophons of Armenian manuscripts in the Gulbenkian collection, with the purpose of including these manuscripts in a wider scholarly discussion of relevant fields.
- b) Quest for inspirations of artistic forms and illustrations present in the seventeenth-century Armenian manuscripts and discussion of their iconographic similarities or differences traced within concepts of local and other manuscript cultures, considering medieval to early modern periods.
- c) Understanding of ancient practices employed in manuscript illuminations, focused on technical knowledge for preparation and application of various pigments, with particular emphasis on organic red pigments profusely used in Armenian illuminations and deeply believed to be made of Armenian cochineal (*Porphyrophora hamelii*).

- d) Insight into the general color palette of manuscripts under the scope, by performing material analysis at molecular and elemental level, and by describing the complete paint formulations, ink compositions, and painting techniques used by the artists.
- e) Assessment of the state of conservation of the manuscripts by evaluating the conditions of the analyzed paints and inks, by predicting the original colors, and by understanding the degradation issues that occurred over the centuries, aimed at potential conservation and restoration measures, after careful consideration.

To approach the above-mentioned objectives, the study has implemented the following steps:

- a) Preliminary observation of the codices focusing on their physical features, codicological description, and completion of the manuscript assessment forms.
- b) Analysis of possibly preserved colophons to contextualize the biography of each manuscript.
- c) Analysis of the socio-cultural and historical reality of Armenian communities in which the codices were produced, stressing the importance of handwritten books and the continuity of their production during the given period.
- d) In-depth analysis of miniatures, ornaments, and pictorial programs in general, distinguishing the typical Armenian art forms, and inspirations from other manuscript cultures.
- e) Technical examination, including the molecular and elemental characterization of the materials, mainly inks and pigments, employed in manuscript production.
- f) Historical reconstructions of Armenian cochineal recipes for inks and pigments, chemical analysis of produced pigments and respective ingredients, their comparison with organic reds present in original manuscripts, and compilation of a database for produced recipes.

1.4. Methodology

To efficiently address the questions of this study, the above-mentioned objectives were distributed within a three-pronged methodology that includes (a) Art history; (b) Art technology; (c) Art chemistry (Figure 4). In this way, we could pursue a holistic understanding of what is called an “illuminated manuscript” by all its constituents. The road map for the selected methodology was depicted as follows - while visually assessing the images, we could also identify the nature of the materials that render such eye-catching compositions, and while assessing the materials, we could seek the ancient knowledge and techniques that produced them. Details for each section of the methodology are given below.

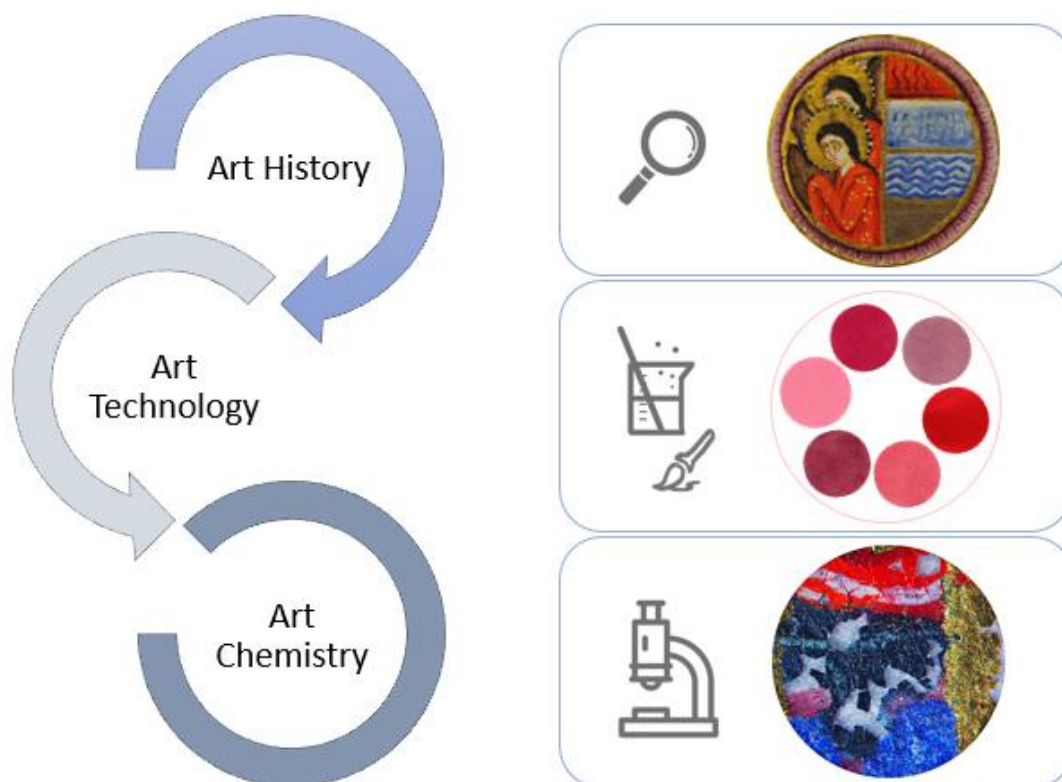


Figure 4. Schematic design of the methodology in three sections.

1.4.1. Art History

The very early adoption of Christianity as a state religion played a crucial role in the development of deeply religious Oriental art in Christian Armenia [58-59]. Geography also played an important role in the process of artistic manifestation. Therefore, the style and iconography of Armenian illuminations developed under certain circumstances [Figure 1, Table 1]. Along with local artistic traditions, it reflects clear parallels with manuscript cultures of regional vicinities, such as Syriac, Byzantine, and Coptic. Apart from that, some other features of Armenian manuscript art are interchanged within the cultures of the Latin West and Islamic East [107-112, 29, 22]. This communication of visual representations between Armenia and other cultures took place during the different historical periods through direct or indirect cross-cultural contacts. However, when evaluating the style of the Armenian illuminations, despite the idiosyncrasies of individual masters or workshops, one may recognize the strong continuity of traditional concepts established and steadily maintained in the local *scriptoria*.

Armenian manuscripts of the Gulbenkian collection offer a perfect possibility to evaluate the artistic choices adopted by some of the last centers of Armenian manuscript production, Constantinople, Crimea, and New Julfa. For us, it was quite interesting and challenging at the same time to unequivocally refer to the art of these manuscripts. We had to

consider the time and environment in which they were produced. During the seventeenth century, manuscript art experienced a sudden rise, particularly in the Armenian diasporas, where the merchant communities played a crucial role in art patronage [113-114]. The art of these diaspora centers is eclectic, reflecting the tendencies widely circulating in multicultural environments such as Constantinople and Isfahan [115]. The book illumination was continued in the Armenian communities. It was deeply influenced by the art of Western printed books, which can be particularly observed within the illuminations of the seventeenth-century Armenian Bibles, copiously produced during this period. At the same time, Armenian artists were skillfully juxtaposing the newly emerged trends with traditional approaches, sometimes posing their individual interpretations of certain images. These traditional approaches of early modern artists are explicitly reflected in their references to medieval art. Therefore, it was quite intriguing for us to define the limits between tradition and novelty present in the art of the manuscripts under our study.

The art historical study of the Gulbenkian Armenian manuscripts was constructed upon the historical context previously retrieved from the colophons of each manuscript. This preliminary information guided us toward certain schools of illumination, artists, and scribes, resulting in extensive comparative studies within the local context of Armenian artistic production. Several iconographic parallels were established between manuscripts coming from distinct schools and historical periods. Apart from that, a large comparative work has been done within a much global context, with the inclusion of Western manuscripts. This was particularly applied to the case of the Gulbenkian Bible (LA 152), evoked by its unique illuminations of Latin-inspired art. Art historical analysis allowed us to better understand the aesthetic choice of given *scriptoria*, to establish the individual features for each manuscript, and to suggest the clusters of manuscripts sharing similar iconography with those of our study. The outcomes of this methodology can be found in Chapter 3 of this dissertation.

1.4.2. Art Technology

The written sources on artistic techniques are key components for professionals who seek to explore the composition and preparation process for historical artistic materials. These sources are known as art treatises, recipe books, or compilations, which contain practical information on the preparation of various components of the artwork. There are numerous treatises, mostly from medieval and early modern periods, that transmit the practical knowledge and secrets of ancient masters to our days. A large number of them concern manuscript illumination, providing a variety of recipes and indications on how to prepare and apply the inks and pigments [116-121]. Nowadays, this information can be efficiently used in the field of art historical reconstructions, closely related to experimental archaeology.

Organized medieval treatises or manuals for artists are quite abundant in Western cultures. Armenian sources, however, are not very eloquent in terms of art technological

compilations, except from some studies [122-125]. In the Armenian case, the recipes intended for scriptorial practices can seamlessly cross the manuscript typologies and appear written within the collections of medical, scientific, or other miscellaneous texts. The recovery of this hidden knowledge is rather important. It will allow us to approach the workshops of our ancient masters, to re-imagine their environment and working conditions, to perceive their possibilities and limitations, and many more aspects. By knowing certain recipe formulations, we can compare their reproduced versions with compositions found in the original works of art. Additionally, we may compare the local practices within different Armenian *scriptoria*, and with other cultures as well to trace the possible paths for knowledge transmission.

In the present study, we decided to address the methodology of historically accurate reconstructions to a specific category of organic pigments based on cochineal, a scale insect used since ancient times as a source of natural dye, resulting in a variety of shades of carmine. Our interest in these animal-derived pigments was conditioned by a belief that cochineal reds have found their utmost use in Armenian illuminations. To give a scientific explanation to this statement we developed a three-step work plan of (a) archival, (b) field, and (c) laboratory activities. The first step was to recover the possibly existing recipes for the Armenian cochineal, preserved in the written historical sources. The second step included on-site observation of Armenian cochineal in its original habitat. After the rationalization of the retrieved recipes and the gathering of the necessary ingredients, we embarked on the third step consisting of historical reconstructions, trying to be as closer as possible to their original context. It was not an easy task, but a rewarding one. The process of Armenian cochineal trials and outcomes in detail can be found in Chapter 4 of the present dissertation.

1.4.3. Art Chemistry

A seventh-century Armenian scholar Vrt'anes K'ert'ot said that "By the beauty of visible we approach invisible" [126]. In the medieval worldview, the mystery of the invisible was disentangled through visual materiality. Therefore, the materials employed by the artists and craftsmen in the production of what makes up today's cultural heritage had much more significance than one may imagine. In the case of illuminated manuscripts, it is important to know which materials were used in the past for the execution of such enduring treasures. Material identification brings into light a deeper insight into many historical aspects, such as the trade, circulation, and availability of certain raw materials, the economic potential of the given societal groups, cultural beliefs that shape the preferences towards specific pigments or colors, and much more phenomena. Therefore, material knowledge can offer an important contribution to many disciplines, from history to cultural studies. This knowledge is indispensable for museum professionals, in terms of guiding correct conservation and restoration strategies.

By conducting material analysis for the Gulbenkian manuscripts, our goal was to contribute to a field where there are still many lacunae. We opted to focus on the identification of the pigments and inks applied to the illuminations of our manuscripts and to assess their condition and composition. The pigments of organic and inorganic origin were analyzed by a multi-analytical approach, which allowed us to obtain a comprehensive understanding of paint formulations. This approach provided us with the possibility to evaluate the preservation state of the paints analyzed. Visually, the paints render vivid and brilliant colors and are mostly well-preserved. However, a closer examination delineates a perfect preservation state for some pigments, while degradation issues for others. Therefore, to truly understand whether the illumination colors are maintained as close as possible to their original state, or they undergo degradation processes, a closer look with analytical methods is crucial.

In this study, we selected a portable fiber-optic microscope, FORS, and μ Raman spectroscopies for the initial screening, which has been followed by μ EDXRF analyses and other complementary techniques when needed. This combined approach of molecular and elemental analyses allowed us to assess the paint compositions and their preservation state. The detailed description and the results of this stage of the study can be found in Chapter 5 of the present dissertation.

1.5. Study Sources

This study is based on primary and secondary sources. The primary sources include illuminated manuscripts, historical texts on art technology, and archival documents. The principal group consisting of manuscripts is the one upon which the study was constructed. These manuscripts are held by the Gulbenkian Museum. Another group of manuscripts was used as a solid ground for our extensive comparative studies with the ones from the Gulbenkian collection. This comparative stage was implemented mostly to elucidate the questions related to the iconography, dating, and historical background of the main subjects of the study. This second group of manuscripts is held by the Matenadaran Institute and is related to the methodology section of “Art History” in our project. Additionally, several manuscripts of miscellanea content, preserved in Matenadaran, were consulted, from which it was possible to retrieve technical descriptions and recipes for Armenian cochineal preparations. These sources are related to the methodology section of “Art technology” in our project. Finally, the archival documents related to acquisition history and the very first descriptions of the Gulbenkian Armenian manuscripts were consulted for the unequivocal presentation of the study material. These documents have been assessed in the Gulbenkian Archives.

The secondary sources comprise relevant bibliography of possibly the most applicable studies for each stage of the work. A scholarship from both local Armenian and global European contexts was thoroughly explored. We based our interpretations not only on the most recent studies but also on the studies published in the relatively distant past. For instance, there is a large scholarship dedicated to Armenian manuscripts, some even touching the material aspects, that emerged in the Academy of Soviet Armenia (1920-1991). This literature, generally available in Armenian or Russian languages, was of big support to us, as it contains some less referenced but valuable research on important issues sought by us. Extensive literature related to art, history, colophons, and schools of illumination of Armenian manuscripts was explored. Studies particularly referring to the seventeenth-century history of Armenian diaspora communities were considered as well. For art historical, art technological, and material analysis we dealt with a large number of works related to manuscripts from the Western European context, where this kind of interdisciplinary approaches have already obtained their solid forms [127-136].

1.6. References

- [1] Abrahamyan, A. (1959). *Matenadarani jeřagir ganjerə* [The Manuscript Treasures of Matenadaran]. Haypethrat, Erewan, p. 15-25.
- [2] Izmajlova, T. A., Ayvazyan, M. (1962). *Iskusstvo Armenii* [Art of Armenia]. Iskusstvo, Moscow.
- [3] Der Nersessian, S. (1977). *L'Art Arménien. Art e métiers graphiques*, Paris.
- [4] Durnovo, L. A. (1979). *Ocerki izobrazitel'nogo iskusstva srednevekovoj Armenii* [Essays on the Fine Arts of Medieval Armenia]. Iskusstvo, Moscow.
- [5] Kouymjian, D. (1992). *The Arts of Armenia*. Calouste Gulbenkian Foundation. Lisbon.
- [6] Kouymjian, D. (2007). *La structure et l'illustration des manuscrits arméniens*. In: *Arménie: la magie de l'écrit*, C. Mutafian (ed.), Somogy Édition d'ART, Paris, p. 82-93.
- [7] Kouymjian, D. (2015). *Armenian Manuscripts*. In: *Comparative Oriental Manuscript Studies: An Introduction*, COMSt (Comparative Oriental Manuscript Studies), Hamburg, p. 38-40.
- [8] Mathews, Th. F. (1994). *The Art of the Armenian Manuscript*. In: *Treasures in Heaven: Armenian Illuminated Manuscripts*. Th. F. Mathews, R. S. Wieck (eds.), The Pierpont Morgan Library and Princeton University Press, York, NY, Princeton, NJ, p. 39-41.
- [9] Koryown (V century). *Vark' Mařtoc' i* [Life of Mařtoc']. A. Mat' ewosyan (ed.), Erewan, 1994, pp 39-45.
- [10] Lint, Th. M. van. (2015). *The Armenian People, their History and Culture*. In: *Armenia: Masterpieces from an Enduring Culture*. Th. M. van Lint and R. Meyer (eds.), Bodleian Library, University of Oxford, p. 16.
- [11] Merian, S. L. (2015). *Illuminated Manuscripts: The Collection in Context*. In: *Armenia: Masterpieces from an Enduring Culture*. Th. M. van Lint and R. Meyer (eds.), Bodleian Library, University of Oxford, p. 52.
- [12] Mayr C'owc'ak hayeren jeřagrac' Mařtoc' i anvan Matenadarani [General Catalogue of Armenian Manuscripts of Mařtoc' Matenadaran] (1984-2019). Vols. 1-10, Matenadaran, Erewan.
- [13] Merian, S. L. (2018). *The Invention of the Armenian Alphabet*. In: *Armenia: Art, Religion, and Trade in the Middle Ages*. H. C. Evans (ed.), The Metropolitan Museum of Art, New York, cat. 2, p. 43.
- [14] Der Nersessian, S. (1933). *The Date of the Initial Miniatures of the Etchmiadzin Gospel*. *The Art Bulletin*, 15:4, p. 327-360.

- [15] Kouymjian, D. (1983). Dated Armenian Manuscripts as a Statistical Tool for Armenian History. In: *Medieval Armenian Culture*, T. Samuelian and M. Stone (eds.), University of Pennsylvania, Armenian Texts and Studies, Vol. 6 (Chico, CA), p. 425-439.
- [16] Dédéyan, G. (2007). *Histoire du peuple arménien*. Privat, Toulouse.
- [17] Mutafian, C., Traina, G. (2007). *Arménie: La magie de l'écrit*. Somogy Édition d'ART, Paris.
- [18] Durnovo, L. (1961). *Armenian Miniatures*. Harry N. Abrams, Inc., New York, p. 18-20.
- [19] Kouymjian, D. (2012). *Armenian Medieval Illumination*. In: *Armenia: Imprints of a Civilization*, G. Uluhogian, B. L. Zekiyani, V. Karapetian (eds.), Skira, Milan, p. 91-97.
- [20] Mat'ewosyan, K. (2020). *Haykakan jeṙagir girk'ə ew gr'owt'yan kentronnerə* [Armenian manuscript book and scribal centers]; *Haykakan manrankar'owt'yan himnakan dproc'nerə* [The main schools of Armenian miniature painting]. In: *Patmowt'yan ew mšakowyt'i harc'er* [Issues on History and Culture], Matenadaran, Erewan, p. 21-41.
- [21] Alpoya yan, A. (1961). *Patmowt'iwn Malat'ioy Hayoc'* [History of the Armenians in Malatia]. Sevan Press, Beirut, p. 325-336.
- [22] Kouymjian, D. (2013). *The Melitene Group of Armenian Miniature Painting in the Eleventh Century*. In: *Armenian Kesaria-Kayseri and Cappadocia*, R. Hovannisian (ed.), Costa Mesa, California, p. 81-93.
- [23] Mathews, Th. F. (1994). *The Classical Phase of Bagratid and Artsruni Illumination*. In: *Treasures in Heaven: Armenian Illuminated Manuscripts*. Th. F. Mathews, R. S. Wieck (eds.), The Pierpont Morgan Library and Princeton University Press, York, NY, Princeton, NJ, p. 54-66.
- [24] Hovanissian R. (2011). *Armenian Kars and Ani*. Costa Mesa, California.
- [25] Mathews, Th. F., Lint, Th. M. van. (2015). *The Kars-Tsamandos Group of Armenian Illuminated Manuscripts of the 11th Century*. In: *Der Doppeladler. Byzanz und die Seldschuken in Anatolien vom späten 11. bis zum 13. Jahrhundert*, p. 85-95.
- [26] Mat'ewosyan, K. (1997). *Ani: Ekelec'akan kyank'ə ew jeṙagrakan aṙangowt'yownə* [Ani: The Ecclesiastical Life and Manuscript Heritage], Mother See of Holy Êjmiacin, Êjmiacin.
- [27] Der Nersessian, S. (1993). *Miniature Painting in the Armenian Kingdom of Cilicia from the Twelfth to the Fourteenth Century*. *Dumbarton Oaks, Washington, Vols. 1&2*.
- [28] Mutafian, C. (2002). *Le Royaume Arménien de Cilicie: XIIIe-XIVe siècle*. CNRS Edition, Paris.

- [29] Chookaszian, L. (2009). L'art occidental, l'art français et la miniature arménienne du XIII siècle. In: L' Église arménienne entre Grecs et Latins, I. Augé, G. Dédéyan (eds.), Geuthner, Paris, p. 107-132.
- [30] Evans, H. C. (2018). Hromkla. In: Armenia: Art, Religion and, Trade in the Middle Ages. H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 141-150.
- [31] Abrahamyan, A. (1983). Glajori hamalsaranə [Gladzor University]. Hayastan, Erewan.
- [32] Mathews, Th. F., Sanjian, A. K. (1991). Armenian Gospel Iconography: The Tradition of the Glajor Gospel. Dumbarton Oaks Research Library and Collection, Washington, D.C.
- [33] Maranci, Ch. (2018). Siwnik'. In: Armenia: Art, Religion and, Trade in the Middle Ages. H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 101.
- [34] Leyloyan-Yekmalyan, A. (2018). Schools and *Scriptoria*: Haghpat and Gladzor. In: Armenia: Art, Religion and, Trade in the Middle Ages. H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 110-111.
- [35] Hakobyan, H. (1984). Arc'ax-Owtik'i manrankar 'akan dproc'i mi xowmb jeřagrer [A group of manuscripts of Arc'ax-Owtik' school of illumination]. Banber Matenadaran, 14, p. 135-163.
- [36] Minasyan, T'. (2015). *Scriptoria* of Arts'akh. Matenadaran, Erewan.
- [37] Kouymjian, D. (2015). Descriptive Notice no. 6, Four Gospels. In: Armenia: Masterpieces from an Enduring Culture. Th. M. van Lint and R. Meyer (eds.), Bodleian Library, University of Oxford, p. 82.
- [38] Hakobyan, H. (1982). Vaspowrakani manrankarc'owt'yownə [Miniature of Vaspowrakan]. Matenadaran, Erewan.
- [39] T'owmanyán, L. (2019). Vana lji kłzineri grc'owt'yan kentronnerə [The *Scriptoria* of the Monasteries of the Islands of Lake Van]. Matenadaran, Erewan.
- [40] Kouymjian, D. (1998). Armenia in the Age of Columbus. Armenian Mind, Vol. 2, no. 1, p. 109-126.
- [41] Aslanian, S. (2011). From the Indian Ocean to the Mediterranean: The Global Trade Networks of Armenian Merchants from New Julfa. University of California Press, Los Angeles.
- [42] Hovhannisyan, S. K. (2014). Examination of Armenian Trade Capital (16th-18th centuries) in Light of Fernand Braudel's Civilization Theory. Armenian Review, Vol. 54, no. 3-4, p. 45-59.

- [43] Kouymjian, D. (2014). Between Amsterdam and Constantinople: The Impact of Printing on Armenian Culture. In: *Die Kunst der Armenier im östlichen Europa*, M. Dmitrieva, B. Kovács (eds.), Böhlau Verlag, Köln-Weimar-Vienna, p. 19-26.
- [44] Orengo, A. (2015). 500 Years of Printed Armenian Books. In: *Armenia: Masterpieces from an Enduring Culture*. Th. M. van Lint and R. Meyer (eds.), Bodleian Library, University of Oxford, p. 60-66.
- [45] Merian, S. L. (2018). Armenian *Scriptoria* in Constantinople. *Armenian Scriptoria* in New Julfa. In: *Armenia: Art, Religion, and Trade in the Middle Ages*. H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 235, 272.
- [46] Taylor, A. (1995). *Book Arts of Isfahan: Diversity and Identity in Seventeenth-Century Persia*. The J. Paul Getty Museum, Los Angeles, California, p. 47-78.
- [47] Korxmazyan, E. (1978), *Armânskaâ miniatûra Kryma, XIV-XVII VV.* [Armenian miniature of Crimea, XIV-XVII cc.]. Matenadaran, Erewan.
- [48] Chookaszian, L. (2014). Armenian Book Illumination of Crimea and the Art of Miniaturist Grigor Sukiasants (14th century). In: *Die Kunst der Armenier im östlichen Europa*, M. Dmitrieva, B. Kovács (eds.), Böhlau Verlag, Köln-Weimar-Vienna, p. 190-197.
- [49] Osipian, A. (2015). Practices of Integration and Segregation: Armenian Trading Diasporas in Their Interaction with the Genoese and Venetian Colonies in the Eastern Mediterranean and the Black Sea (1289-1484). In: *Union in Separation. Diasporic Groups and Identities in the Eastern Mediterranean*. G. Christ, F. J. Morche, R. Zaugg, W. Kaiser, S. Burkhardt, A. D. Beihammer (eds.), Viella, Rome, p. 349-362.
- [50] Baghdiantz McCabe, I. (2018). Connections between Constantinople and New Julfa. In: *Armenia: Art, Religion and, Trade in the Middle Ages*. H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 232-233.
- [51] Kouymjian, D. (2008). Index of Armenian Art: Database of Armenian Manuscript Illuminations, available at <https://cah.fresnostate.edu/armenianstudies/resources/iaa-miniatures.html>; and <https://www.openaccess.uni-hamburg.de/datenbanken/index-of-armenian-art.html> (accessed on 1 March 2023).
- [52] Hovsep'yan, G. (1951). *Yišatakarank' jeṛagrac' [Manuscript Colophons]*. Vols. 1-4, Armenian Church Catholicosate of Cilicia, Antelias.
- [53] Sanjian, A. (1969). *Colophons of Armenian Manuscripts, 1301-1480*. Harvard University Press, Cambridge, Massachusetts.

- [54] Mat'ewosyan, A. (2022). Hayeren jeṙagreri hišatakaranerə [The Colophons of the Armenian Manuscripts]. In: Artašes Mat'ewosyan, Ašxatowt'yownner [Artashes Mat'ewosyan, Works], K. Mat'ewosyan (ed.), Matenadaran, Erewan, p. 90-118.
- [55] Sirinian, A. (2017). I colofoni dei manoscritti armeni copiati a Roma (secc. XIII-XIV in.): traduzione italiana con note di commento. *Nέα Ῥώμη*, Rivista di ricerche bizantinistiche, no. 13 (2016), Università degli Studi di Roma «Tor Vergata», Rome, p. 305-338.
- [56] Van Elverdinghe, E. (2018). Recurrent Pattern Modelling in a Corpus of Armenian Manuscript Colophons. *Journal of Data Mining and Digital Humanities*, Vol. Special Issue on Computer-Aided Processing of Intertextuality in Ancient Languages, p. 1-8.
- [57] Harowt'yownyan, X. (2019). Hayeren jeṙagreri hišatakaranerə [The Colophons of the Armenian Manuscripts]. Matenadaran, Erewan.
- [58] Nersessian, V. (1987). *Armenian Illuminated Gospel Books*. The British Library, London, p.3-6.
- [59] Lint, Th. M. van. (2015). Sacred Scripture: Gospels and Bibles. Celebrating the Liturgy: Devotional Books. In: *Armenia: Masterpieces from an Enduring Culture*. Th. M. van Lint and R. Meyer (eds.), Bodleian Library, University of Oxford, p. 70-71, 94-95.
- [60] Mat'ewosyan, K. (2009). Samvel Anec'ow amanakagrowt'yan jeṙagrere ew norahayt Irac'owmnerə [The Manuscripts and Newly Discovered Additions of Samvel Anec'is Chronicles]. Nairi, Matenadaran, Erewan.
- [61] Stone, M. E. (2014). Parakanon bangrer ew avandowt'yownner [Apocrypha and Pseudepigrapha Texts], E. T'op'c'yan (transl.), G. Mowradyan (ed.), Nairi, Matenadaran, Erewan.
- [62] Azaryan, L. (1964). Kilikyan manrankarc'owt'yownə, XII-XIII dd. [Cilician miniatures of the XII-XIII centuries]. HSSH GA hrat, Erewan.
- [63] Der Nersessian, S. (1973). *Études Byzantines et Arméniennes / Byzantine and Armenian Studies*. Vols. 1-2, Imprimerie Orientaliste, Louvain.
- [64] Korxmazyan, E. (1984). *Armenian Miniatures of the 13th and 14th Centuries from the Matenadaran Collection*. Matenadaran, Erewan.
- [65] Der Nersessian, S. (1986). *Armenian miniatures from Isfahan*. Les Editeurs d'Art Associés, Brussels.
- [66] Mathews, Th. F., Taylor, A. (2001). *The Armenian Gospels of Gladzor: The Life of Christ Illuminated*. The J. Paul Getty Museum, Los Angeles, California.
- [67] Aṙāk'elyan, M. (2012). *Mesrop of Xizan: An Armenian Master of the Seventeenth Century*. Sam Fogg, London.

- [68] Mat'ewosyan, A. (1997). Mecop'avank'i grc'owt'yan kentronə, B- E dd. [The *Scriptorium* of Mecop'avank', XII-XV centuries]. Mother See of Holy Êjmiacin, Êjmiacin.
- [69] Badalyan, H. (2013). Skewrāyi grc'owt'yan kentronə [The *Scriptorium* of Skewrā]. Matenadaran, Nairi, Erewan.
- [70] Merian, S. L., Mathews, Th. F., Orna, M.V. (1994). The Making of an Armenian Manuscript. In: Treasures in Heaven: Armenian Illuminated Manuscripts. Th. F. Mathews, R. S. Wieck (eds.), The Pierpont Morgan Library and Princeton University Press, York, NY, Princeton, NJ, p. 124-134.
- [71] Kouymjian, D. (2015). Armenian Codicology. Armenian Palaeography. In: Comparative Oriental Manuscript Studies: An Introduction, COMSt (Comparative Oriental Manuscript Studies), Hamburg, p. 116-132, 277-283.
- [72] Abrahamyan, A. (1940). Hamaṛot owrvagic haykakan paleografiayi [A Brief Outline of Armenian Paleography]. Erewan State University, Erewan.
- [73] Stone, M., Kouymjian, D., Lehmann, H. (2002). Album of Armenian Paleography. Aarhus University Press.
- [74] Kouymjian, D. (2015) Armenian Writing: Palaeography, Epigraphy and Calligraphy In: Armenia: Masterpieces from an Enduring Culture. Th. M. van Lint and R. Meyer (eds.), Bodleian Library, University of Oxford, p. 41-46.
- [75] Aṛak'elyan, B. (1958). Kazmeri zardarman arvestə miṅnadaryan Hayastanowm [The art of bookbinding in medieval Armenia]. Banber Matenadarani, no. 4, p. 182-203.
- [76] Merian, S. L. (1993). The Structure of Armenian Bookbinding and Its Relation to Near-Eastern Bookmaking Traditions. Ph.D. dissertation, Columbia University.
- [77] Kouymjian, D. (1995). The New Julfa Style of Armenian Manuscript Binding. Journal of the Society for Armenian Studies, Vol. 8, p. 13-36.
- [78] Schwahn, W., Engel, P. (2005). Das Armenische Buch: Prototyp. Handes Amsorya, no. 1-12, p. 447-456.
- [79] Kouymjian, D. (2006). From Manuscript to Printed Book: Armenian Bookbinding, Sixteenth to Nineteenth Century. Gazette du livre médiéval, no. 49, p. 1-14.
- [80] Kouymjian, D. (2008). Post-Byzantine Armenian Bookbinding and Its Relationship to the Greek Tradition. In: The Book in Byzantium: Byzantine and Post-Byzantine Bookbinding, N. Tsironis (ed.), Athens, p. 163-176.
- [81] Khan, Y. R., Ohanyan, T'. (2013). Deceptive Covers: Armenian Bindings of 18th-Century Imprints from Constantinople. The Book and Paper Group Annual 32, p. 109-117.

- [82] Malxasyan, A. (2022). Haykakan kazmararakan dproc'nerə ew Matenadarani hayeren jeřagreri kazmeri arjanagrowt'yownnerə [The Armenian bookbinding schools and the binding inscriptions of the Armenian manuscripts in Matenadaran]. Matenadaran, Erewan.
- [83] Merian, S. L. (2011). Notes on Two Pairs of Armenian Silver Plaques from Kayseri in the Musée Arménien de France. *Manuscripta* 55.1, p. 109–22.
- [84] Jaschke, M., Stähle, R. (2015). *Kostbare Einbandbeschläge an armenischen Handschriften*. Wiesbaden, Reichert
- [85] Kouymjian, D. (2015). Silver Bindings. In: *The Armenian Catholicosate of Cilicia: History, Treasures, Mission, Antelias*, p. 218-284.
- [86] Orna, M. V., Mathews, Th. F. (1981). Pigment Analysis of the Glajor Gospel Book of U.C.L.A. *Studies in Conservation* 26, p. 57-72. DOI: 10.1179/sic.1981.26.2.57.
- [87] Cabelli, D., Mathews, Th.F. (1982). The Palette of Khatchatur of Khizan. *Journal of Walters Art Gallery* 40, p. 37-40.
- [88] Cabelli, D., Orna, M. V., Mathews, Th. F. (1984). Analysis of Medieval Pigments from Cilician Armenia. In: *Archaeological Chemistry—III, Chapter 12*, American Chemical Society, Washington, D.C., p. 243-254. DOI: 10.1021/ba-1984-0205.ch012.
- [89] Orna, M. V., Mathews, Th. F. (1988) Uncovering the Secrets of Medieval Artists. *Analytical Chemistry* 60, p. 47A–56A. DOI: 10.1021/ac00152a744.
- [90] Keheyan, Y., Eliazyan, G., Engel, P., Rittmeier, B. (2009) Py/GC/MS characterisation of naturally and artificially aged inks and papers. *Journal of Analytical and Applied Pyrolysis* 86, p. 192-199. DOI: 10.1016/j.jaap.2009.06.004.
- [91] Baraldi, P., Keheyan, Y. (2016). Characterization of pigments of some Armenian illuminated manuscripts by Raman microscopy. *Bnakan Gitowt'yownner / Natural Sciences* 2, p. 8-12.
- [92] Keheyan, Y., Baraldi, P., Eliazian, G., Cesaro, S. N., Ferro, D. (2016) History and chemical characterization of a fourteenth century Armenian illuminated Gospel from the Aghtamar island. *Hayastani k'imiakan handes / Chemical Journal of Armenia* 69, p. 208-225.
- [93] Keheyan, Y., Baraldi, P., Agostino, A., Fenoglio, G., Aceto, M. (2016). Spectroscopic study of an Armenian manuscript from Biblioteca Universitaria di Bologna. *European Journal of Science and Theology* 12, p. 189-201.
- [94] Keheyan, Y., Aceto, M., Cala, E., Gulmini, M., Idone, A. (2018). Characterization of colorants on a 15th century Armenian manuscript by means of different spectroscopic techniques. *e-Preservation Science* 15, p. 1-8.

- [95] Eliazyan, G., Keheyan, Y., Ajvazyan, A., Petrosyan, A. (2021). The conservation and restoration of the Tsughrut Gospel. In: *Care and Conservation of Manuscripts*, Vol. 17, M. J. Driscoll (ed.), Museum Tusulanum Press, Copenhagen, p. 233-243.
- [96] Brostoff, L. B., Khan, Y. R., Ohanyan, T., Hengemihle, F. (2010). Technical study of a fifteenth-century Armenian illuminated Gospel from the Verin Noravank Monastery. *Studies in Conservation* 55, p. 62-68, Supplement-2.62. DOI: 10.1179/sic.2010.55.
- [97] Rabin, I., Binetti, M. (2014). NIR Reflectography reveals ink type: Pilot study of 12 Armenian MSS of the Staatsbibliothek zu Berlin. *Banber Matenadarani* 21, p. 465-470.
- [98] Maybury, I. J., Howell, D., Terras, M., Viles, H. (2018). Comparing the effectiveness of hyperspectral imaging and Raman spectroscopy: A case study on Armenian manuscripts. *Heritage Science* 6, 42. DOI: 10.1186/s40494-018-0206-1.
- [99] Vichi, A., Eliazyan, G., Kazarian, S. G. (2018). Study of the Degradation and Conservation of Historical Leather Book Covers with Macro Attenuated Total Reflection Fourier Transform Infrared Spectroscopic Imaging. *ACS Omega* 3, p. 7150-7157. DOI: 10.1021/acsomega.8b00773.
- [100] Schmidt, A. (2015). *Catalogues of Armenian manuscripts. Comparative Oriental Manuscript Studies: An Introduction, COMSt (Comparative Oriental Manuscript Studies)*, Hamburg, p. 476-481.
- [101] Various authors (1984-2019). *Mayr c'owc'ak hayerên jeṙagrac' Maštoc'i Anowan Matenadarani [General Catalogue of Armenian Manuscripts of the Matenadaran after Maštoc']*. Matenadaran, Vols. 1-10.
- [102] Mat'ewosyan, A. (1988). *Hayeren jeṙagreri hišatakaranner, E- B dd. [Colophons of Armenian Manuscripts, V-XII centuries]*. Erewan.
- [103] Xa 'ikyan, L. (1955-1967). *E dari hayeren jeṙagreri hišatakaranner [Colophons of Armenian Manuscripts, XV century]*. Vols. 1-3, Erewan.
- [104] Hakobyan, V., Hovhannisyán, A. (1974-1984). *Hayeren jeṙagreri Ê dari hišatakaranner [Colophons of Armenian Manuscripts, XVII century]*. Vols. 1-3, Erewan.
- [105] Gevorgyan, A. (1998). *Hay manrankaric'ner, matenagitowt'iwn, IX-XIX dd. [Armenian miniature painters, Bibliography, IX-XIX centuries]*. Cairo.
- [106] Gevorgyan, A. (2005). *Ananownhay manrankaric'ner, matenagitowt'iwn, IX-XVII dd. [Anonymous Armenian miniature painters, Bibliography, IX-XVII centuries]*. Cairo.
- [107] Der Nersessian, S. (1944). *Western Iconographic Themes in Armenian Manuscripts. Gazette des beaux-arts, Ser. 6, Vol. 26, p. 71-94.*

- [108] Kouymjian, D. (1986). Chinese Elements in Armenian Miniature Painting in the Mongol Period. In: *Armenian Studies in Memoriam Haig Berbérian*, Lisbon, p. 415-468.
- [109] Rapti, I. (2003-04). Un tétraévangile arménien de 1313 et ses miniatures géorgiennes. *Revue des études arméniennes*, Vol. 29, p. 259-321.
- [110] Kouymjian, D. (2008). The Intrusion of East Asian Imagery in Thirteenth Century Armenia: Political and Cultural Exchange along the Silk Road. In: *The Journey of Maps and Images on the Silk Road*, F. Philippe, K. Andreas (eds.), Brill, Leiden, p. 119-133.
- [111] Pace, V. (2009-10). Thirteenth-Century Cilician Manuscript Illumination, Umbria and Bologna: Old and New Evidence of the Armenian Contribution to Italian Painting. *Hask hayagitakan taregirk' , B tari* [Hask Armenological Yearbook, Year 12], The Armenian Catholicosate of Cilicia, Antelias, p. 509-521.
- [112] Darwish, M. A. (2016). Two Armenian Bibles with Arabic Influences of miniature painting (Gregor Tatevatsi 1346-1410). *International Journal for Innovation Education and Research*, Vol. 4, no. 8, p. 71-99.
- [113] Landau, A., van Lint, Th. M. (2015). Armenian Merchant Patronage of New Julfa's Sacred Spaces. In: *Sacred Precincts*, Gh. Mohammad (ed.), Brill, Leiden, p. 308-333.
- [114] Maranci, Ch. (2018). Greater Armenian Art and Patronage. In: *Armenia: Art, Religion, and Trade in the Middle Ages*. H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 178-180.
- [115] Evans, H. C., Merian, S. L. (1994). The Final Centuries: Armenian Manuscripts of the Diaspora. In: *Treasures in Heaven: Armenian Illuminated Manuscripts*. Th. F. Mathews, R. S. Wieck (eds.), The Pierpont Morgan Library and Princeton University Press, York, NY, Princeton, NJ, p. 103 -124.
- [116] Cennini, C. (1997). *Il libro dell'arte*. Reprint, Neri Pozza Editore, Vicenza.
- [117] Merrifield, M. M. (1999). *Medieval and Renaissance treatises on the arts of painting: original texts with English translations*. Dover Publications. New York.
- [118] Smith, C.S., Hawthorne, J. G. (1974). *Mappae clavicula: a little key to the world of medieval techniques*. *Transactions of the American Philosophical Society*, 64 (4), p. 1-128.
- [119] Brunello, F. (1992). *De Arte Illuminandi e altri tratatti sulla técnica della miniatura medievale*. Neri Pozza Editore, Padova.
- [120] Strolovitch, D. (2010). O livro de komo se fazen as cores das tintas todas (Transliteration). In: *As Matérias da Imagem*, LU Afonso (ed.), Campo da Comunicação, Lisbon.

- [121] Clarke, M. (2011). *Mediaeval Painters' Materials and Techniques: The Montpellier Liber Diversarum Arcium*. Archetype, London.
- [122] MS Arménien 186, Bibliothèque Nationale de France (1911). A. Tchobanian (ed.), *Vasn Nałashi [On Painter]*. *Anahit* 12, p. 130-132.
- [123] MS Arménien 186, Bibliothèque Nationale de France (1924). F. Macler (transl.), *Documents d'Art Arméniens, De Arte illustrandi*. Librairie Orientaliste Paul Geuthner, Paris, p. 13-16.
- [124] Handes Amsorya (ed.) (1895). *Goynerow baładrowt' ean etanak ašt hnoc' [Preparation of Colors according to Ancients]*, Mekhitarist Print, Vienna, no. 3, p. 87, no. 10, p. 316-319, no. 12, p. 370-371.
- [125] Harutyunyan, A. (1941). *Nerkeri ev t'anak'neri gorcacut'yunə hin haykakan jeřagrerum [The Use of Paints and Inks in Ancient Armenian Manuscripts]*. Matenadaran, Yerevan.
- [126] Vrt'anes K'ert'ot' (2004). *Yałags Patkeramartic' [Against the Iconoclasts]*. E. Melk'onyan (ed.), *Matenagirk' Hayoc' (VI century)*, Vol. 3, Armenian Church Catholicosate of Cilicia, Antelias, p. 493-500.
- [127] Claro, A. (2009). *An interdisciplinary approach to the study of color in Portuguese manuscript illuminations*. Doctoral dissertation. Universidade NOVA de Lisboa, Lisbon.
- [128] Melo, M. J., Castro, R. (2016). "O livro de como se fazem as cores": medieval colors for practitioners. Online edition. <https://www.dcr.fct.unl.pt/LivComoFazemCores>
- [129] Kirby, J., van Bommel, M., Verhecken, A. (2014). *Natural colorants for dyeing and lake pigments: practical recipes and their historical sources*. Archetype, London.
- [130] Vitorino, T., Otero, V., Carlyle, L., Melo, M. J., Parola, A. J., Picollo, M. (2017). *Nineteenth-century cochineal lake pigments from Winsor & Newton: Insight into their methodology through reconstructions*. In: *ICOM-CC 18th Triennial Conference Preprints*, J. Bridgland (ed.), Copenhagen.
- [131] Melo, M. J., Nabais, P., Guimarães, M., Araújo, R., Castro, R., Oliveira, M. C., Whitworth, I. (2016). *Organic dyes in illuminated manuscripts: an unique cultural and historic record*. *Philosophical Transactions of the Royal Society A*, 374 (2082): 20160050. DOI: 10.1098/rsta.2016.0050.
- [132] Doherty, B., Daveri, A., Clementi, C., Romani, A., Bioletti, S., Brunetti, B., Sgamellotti, A., Miliani, C. (2013). *The Book of Kells: a non-invasive MOLAB investigation by complementary spectroscopic techniques*. *Spectrochimica Acta A*, 115:330-6. DOI: 10.1016/j.saa.2013.06.020.

- [133] Aceto, M., Idone, A., Agostino, A., Fenoglio, G., Gulmini, M., Baraldi, P., Crivello, F. (2014). Non-invasive investigation on a VI century purple codex from Brescia, Italy. *Spectrochimica Acta A*, 117:34-41. DOI: 10.1016/j.saa.2013.07.092.
- [134] Nabais, P., Castro, R., Lopes, G. V., de Sousa, L. C., Melo, M. J. (2016). Singing with light: an interdisciplinary study on the medieval Ajuda Songbook. *Journal of Medieval Iberian Studies*, 8(2):283-312. DOI: 10.1080/17546559.2016.1234061
- [135] Ricciardi, P., Panayotova, S. (2018). *Manuscripts in the Making: Art and Science*. Vol 2, Harvey Miller-Brepols, London-Turnhout.
- [136] Melo, M. J., Nabais, P., Vieira, M., Araújo, R., Otero, V., Lopes, J., Martín, L. (2022). Between past and future: Advanced studies of ancient colors to safeguard cultural heritage and new sustainable applications. *Dyes and Pigments*, 208:110815.



CHAPTER 2

Detail, bird-ornament, LA 152, p. 1162

2. CORPUS OF THE STUDY MATERIAL

The purpose of this chapter is to present the main corpus of the study material, along with all the relevant information related to it. It will reflect the life and activity of Calouste Gulbenkian, a man, whose collection includes the manuscripts that are the subject of our study. The collection makes up part of the museum named after Gulbenkian. There are many studies dedicated to Gulbenkian, therefore, to not be repetitive, we opted to provide a brief narrative of his life trajectory, that will help the reader to dive into the world of Gulbenkian the art collector. In the following section, the history of the acquisition of the Armenian manuscripts by Gulbenkian and relevant details are presented. After, the historical background of the manuscripts and the colophons are discussed. This section is constructed upon the information retrieved from the preserved colophons. It portrays the time and environment related to the manuscripts, followed by analyses of the colophons and a section discussing the identity of the scribes, artists, and patrons connected with the biography of these precious manuscripts. The chapter includes four Appendices that represent the physical description (Appendix A), content description (Appendix B), bookbinding (Appendix C), and transcribed colophons (Appendix D) for each manuscript.

2.1. Calouste Gulbenkian: The Art Connoisseur

The name Gulbenkian is associated with wealth, achievement, expertise, philanthropy, and art. For someone of Armenian descent, this name has particular importance and a specific place on the map of notable Armenians around the world. Calouste Sarkis Gulbenkian was a prominent businessman, philanthropist, and art collector. Nowadays, in the heart of Portugal's capital Lisbon, a Foundation named after Gulbenkian is one of the world-leading institutions promoting art, education, science, and benevolence.

Much has been written and said about his personality and work. The life trajectories of Gulbenkian took him from Constantinople to the westernmost point of Europe, Lisbon. Calouste was born in 1869 in Scutari (Constantinople, Ottoman Empire, present-day Üsküdar in Istanbul), in a family of Armenian parents. The prosperous situation of Gulbenkian's family living in the Ottoman capital allowed him to obtain a substantial education and travel from the very young years of his life. His studies in Constantinople and Marseille were completed at the King's College of London, where Gulbenkian obtained his diploma of distinction in 1887. As a young professional, he stepped into the world of oil affairs, becoming a prominent and intelligent businessman in this industry and an efficient agent in introducing Middle Eastern oil strategies into negotiations worldwide. His diligent work was granted 5% of capital, attributed only to him during his negotiations, which made him known as "Mr. Five

Per Cent” in the oil industry [1]. Gulbenkian traveled extensively, having his main residencies in London and Paris. During the Second World War, after several fluctuations in his life, Gulbenkian found his harbor in Lisbon, where he lived his last years in peace, and passed away in 1955.



Figure 5. Calouste Gulbenkian in the 1890s.
© Fundação Calouste Gulbenkian

Gulbenkian was one of the wealthiest men of his time. Apart from business, he was a renowned philanthropist. A generous deal of his profit was disposed of for numerous charitable commitments, addressed mostly to schools, hospitals, and churches, with particular attention to Armenian communities and establishments. Examples of Gulbenkian’s generosity include the building of the St. Sarkis Armenian church in London, the establishment of a big library in the St. James Cathedral of the Armenian Patriarchate of Jerusalem, support to Surp Pırgiç Armenian Hospital in Constantinople (Istanbul), and much more. The last wish of Gulbenkian expressed in his bequest was to establish a foundation based on his legacy, that could continue to implement all his initiatives. His will took form as an outstanding building that emerged in Lisbon, in 1956, which became the headquarter of the Calouste Gulbenkian Foundation, and since then is loyal to the mission Gulbenkian has set [1:7].

Apart from business and philanthropy, Gulbenkian had a tremendous passion for art. During his life, he created an amazing collection of artworks from around the world. These were not objects to him, but companions for life. Over the years, his luxurious houses

elsewhere transformed into private museums, where Gulbenkian found his rejoicing and serenity. Taking advantage of any given opportunity, this man of affairs negotiated and persisted for each unique piece in his collection. This ability Gulbenkian had since ever, from when he bought his first ancient Greek coins in Constantinople being a fourteenth-year old, up to purchasing the large-piece collections from several intermediaries. He was constantly in contact with different art dealers and antiques vendors, in search of the finest possible pieces. Being such an aesthete and art connoisseur, Gulbenkian was not rushing after whatsoever but selecting only the best for his collection [2]. In his bequest, Gulbenkian specifically mentions his will of having all his artworks under one roof, in a museum. After his death, all these pieces were assembled in Portugal, being housed at the beginning in Palácio Marquês de Pombal, in Oeiras. In the following years, Gulbenkian's life companions, roughly 6000 artworks, found their roof in Lisbon. The Calouste Gulbenkian Museum was inaugurated in 1969 and since then, has been one of the world's front-rank museums [3]. Nowadays, the permanent collection of the Museum displays exquisite objects from a wide range of historical periods and geographies: Egyptian, Graeco-Roman, Mesopotamian, Oriental Islamic, Armenian, Far Eastern, and European. The collection includes coins, paintings, textiles and tapestries, books and manuscripts, sculptures, glassware, ceramics, jewelry, and furniture [1, 4]. The Museum is a busy hub of recurring cultural activities and exhibitions. Undoubtedly, this is for what Gulbenkian would have been extremely gratified.



Figure 6. The Gulbenkian Museum. © Fundação Calouste Gulbenkian

2.2 Armenian Manuscripts in the Gulbenkian Museum

On the permanent display of the Gulbenkian Museum, among carefully selected artworks, there are four Armenian illuminated manuscripts exhibited. These few but unique examples of Armenian art reflect the philosophy of the great collector – to find only the best for his collection. These manuscripts are illuminated codices, a Bible (LA 152), and three Gospel Books (LA 193, LA 216, LA 253). Manuscripts seem to arrive in Portugal from Gulbenkian's house in Paris, during the years 1958-60, when all his collection from London, Paris, and Washington was being shipped to Lisbon. Since then, they have been part of the Museum's collection [5].

Gulbenkian acquired the manuscripts during his lifetime from intermediaries, art, and antique vendors or in auctions. Thus, the archival documents indicate that Bible LA 152 was acquired in 1926, in Sotheby's of London, from Sir Malcolm MacGregor of MacGregor, through intermediary Bernard Quaritch; Gospel LA 193 in 1926, in London, from a vendor named Kehyaian & Co, a company apparently trading with antique oriental carpets and other commodities; and Gospel LA 216 in 1935, in Paris, from a vendor of old books named Giraud-Badin [6]. The acquisition history of Gospel LA 253 is unknown. Likewise, it is not known in which way the manuscripts appeared in the antique markets in London and Paris, before being acquired by Gulbenkian. This is a common destiny for many Armenian manuscripts that have been dispersed due to historical circumstances. Fortunately, some preserved colophons of Gulbenkian manuscripts shed light on the origins of these unique objects.

LA 152, LA 193, LA 216, and LA 253 were first described by renowned art historian Sirarpie Der Nersessian [7]. Afterward, some of the manuscripts were reported in exhibition catalogs and scholarly articles [8-10], being the Bible LA 152 receiving the most attention [11-16]. However, this group of codices has a lot more to offer to those interested in manuscript studies, and not only. We hope that this dissertation will make its modest contribution to introducing these exquisite manuscripts to wider audiences. In the next section (2.3.) and following chapter (Chapter 3 (3.1., 3.2.)) a more detailed description of each manuscript can be found.



Figure 7. The four Armenian manuscripts of the Gulbenkian Collection, Lisbon. © Gulbenkian Museum

2.3. Historical Background and Colophons

To better understand any heritage object, it is important first to explore its historical and cultural context. It will help to comprehensively analyze and reconstruct the biography of a given artwork. In our case, we tried to recover as much information as possible related to the manuscripts of our study, starting with preserved colophons. They provided us with a preliminary understanding of the time and environment to which the Gulbenkian manuscripts belong. Here, we give a brief presentation of corresponding historical periods and geographical destinations. Additionally, we assembled the possible information related to the identities of the scribes, artists, and patrons, present in the narratives of each manuscript.

2.3.1. Time and Environment

Four Armenian manuscripts of the Gulbenkian collection were produced in the Armenian diaspora communities of Constantinople, New Julfa, and Crimea, during the seventeenth century. This period was an incredibly interesting time in the development of

Armenian history and art, strongly determined by the political situation of Armenia and the geographical shifts of its population. The seventeenth century was defined as a period of trade diasporas or communities, which played a crucial role in many aspects of Armenian life [17]. After having lost its glorious past of medieval kingdoms and being devastated by continuous invasions of Arabs, Seljuks, Mongols, and Turks, by the end of the sixteenth century, Armenian territories were constantly disputed and divided between the Ottoman and Safavid Empires [18]. Continuous conflicts and wars in the region caused forced migrations of the local population, thus forming several diaspora communities in neighboring destinations, and not only. With time, many of these communities were reorganized into strong and self-sufficient units. During the seventeenth century, this phenomenon was especially apparent in some Armenian communities, fostered by the emergence of a new merchant class. This class of Armenian merchants became a key aspect in the economic and social developments of the early modern Armenian diaspora. But their impact was greater than imagined. These wealthy elites played an essential role in the promotion and patronage of Armenian art and architecture [19]. As a result, in the seventeenth century, artistic production reached its apogee in the Armenian communities of Constantinople, New Julfa, and Crimea. Each of these three diaspora centers emerged under certain historical circumstances and has developed its own distinct community life, described in detail below.



Figure 8. Seventeenth-century Armenian trade diasporas and their global connections.

Constantinople (Present-day Istanbul, Turkey)

In the first half of the fifth century, by the initiative of Mesrop Maštoc¹, inventor of the Armenian alphabet, and with the consent of the Byzantine emperors, Armenian schools were established in Constantinople. During the classical and early medieval periods of Armenian literary developments (fifth-ten centuries), there were active scholarly exchanges between Constantinople and Armenia, based essentially on translational activities. Armenian presence in Constantinople increased over time partly because of Byzantium's policy concerning Armenians, which provoked several migratory flows towards extant territories of the Empire. Armenians, together with Greeks, Jews, and other ethnic groups, were part of the multi-ethnic social strata of the Byzantine Empire, including when the Turks conquered Constantinople in 1453. Armenians were an active component of Byzantium's vibrant reality. In terms of cultural life, many Armenian scholars and intellectuals emerged in the medieval environments of Constantinople, together with various professionals traveling there for work. In the local scriptorial schools, several Armenian manuscripts were produced. Unfortunately, most of them did not survive our days. The earliest known Armenian manuscript written in Constantinople (Matenadaran MS 6202) is a Gospel dated 909 AD. The exchange between Byzantine and Armenian traditions was particularly fluent in miniature art [20].

Constantinople became one of the main hubs of Armenian artistic production especially during the seventeenth century, when Armenian merchants became an important component of the Ottoman capital. In this cosmopolitan environment, the Armenian manuscripts were yet being produced, fostered by wealthy patrons. This artistic production received significant influences particularly from Western printed books, at the same time maintaining its traditional forms and well-established practices. The art of several manuscripts, produced during this period, indicates the artistic contacts between the Armenian *scriptoria* of Constantinople, Crimea, and New Julfa [21].

Crimea

Crimea was one of the prosperous centers of the Armenian diaspora almost for seven centuries, having its apogee during the Middle Ages. There are numerous architectural monuments, stone inscriptions, and manuscript colophons testifying to the Armenian presence in this peninsula. Armenians arrive in Crimea already during the Byzantine times, as a military presence from part of the Empire. In the late centuries, the Armenian merchants appear there, as the peninsula was a profitable destination for transit trade. The migration flows of Armenians towards Crimea were during the eleventh century, after the fall of Ani, the capital of the Armenian Bagratid Kingdom (885-1045), the fourteenth century, when Armenians flee the Mongol invasions, and the sixteenth to seventeenth centuries, especially during the Celali rebellions and forced displacements by Shah Abbas.

The major city of Armenian communities in Crimea was Kaffa (present-day Feodosia). Already in the fourteenth century, Genovese sources mention three Armenian churches in Kaffa. In this period, the southern part of Crimea was dominated by Venetian and Genoese merchants, with whom Armenians made tight contacts. The part of the Armenian community was Catholic, with its corresponding church. Apart from merchants, the community was composed of artists and craftsmen of different professions. There are several names for illuminators and scribes preserved in the colophons of the manuscripts, copiously produced in local *scriptoria*. The activity of scriptorial centers was mostly connected with Armenian monasteries. The Crimean miniature art, despite keeping traditional Armenian characteristics transmitted through people migrations, bears profound inspirations from medieval European art, stimulated by the contacts with Venetians and Genoese. Although many of these manuscripts were destroyed and pillaged after the Turks seized Crimea, however, almost 500 surviving examples testify to the exceptional heritage produced in the Armenian *scriptoria* of Crimea [22, 20:157-196].

New Julfa (District in Present-day Isfahan, Iran)

Armenian communities appear in historical Persia since early medieval times, mainly due to forced migrations and conflictive situations. The population displacements took place in the eleventh century, as a result of the Seljuk invasions, in the thirteenth-fourteenth centuries, as a result of Mongol invasions, and at the beginning of the seventeenth century, as a result of the policy of Persian Shah Abbas. When the Safavid dynasty (1501-1736) came into power, the Persian capital moved to Isfahan. Thus far, the Armenian presence in Isfahan was mentioned in European travel accounts of the sixteenth century. However, the number of Armenians in Isfahan increased dramatically after Shah Abbas forcibly resettled there a big Armenian population, displaced from historical Jowla (Julfa). In Isfahan, the capital of the Safavid Empire, this group of Armenians settled in a district that they named Nor Jowla (New Julfa), alluding to their lost homeland. To augment the commerce of Persia and to oppose the Ottoman power, Shah Abbas granted privileges to Armenians, the majority of them being merchant elites known as xoja (khoja). Shah rewarded them with the monopoly of silk export from the Empire and received his compensation in full. Shortly, New Julfa became one of the most prosperous Armenian communities, where both commerce and art were thriving side by side. Armenian art of this period has greatly benefited from trade contacts that extended from west to east, incorporating the new Western inspirations above all, together with elements of Persian art. Along with that, the local artistic traditions that migrated to a new destination with the Armenians, received their majestic forms in New Julfan art, presenting it in a rather eclectic way. The most remarkable artistic achievements of this period were the frescoes and miniature paintings. In an incredibly short period, Armenian *scriptorium* was established in New Julfa, where numerous manuscripts were produced. Several talented

artists and scribes earned their names in that environment. Surprisingly, the manuscript tradition was continued even when the first Armenian print house was established in New Julfa, in 1636 [23, 20:234-263].

2.3.2. Colophons

The colophons of four manuscripts are discussed in more detail in Chapter 3 (sections 3.1.4. and 3.2.3.). Therefore, here we will skip the detailed information on them. The novel part of this section includes Appendix D with fully transcribed colophons that are presented here in their original Armenian language. Hereinafter, we present the manuscripts according to the extent of their colophons, starting with that of the largest one. Thus, the sequence of the presentation will be as follows: Bible LA 152, Gospel LA 216, Gospel LA 193, and Gospel LA 253.

Bible LA 152

Among the four manuscripts, Bible LA 152 is perhaps the one that has received much scholarly attention. It was described in exhibition catalogs by Maria Queiroz Ribeiro, Vrej Nersessian, and Jorge Rodrigues [11-13]. An essential work by Sylvie Merian [14] includes a detailed reference to this manuscript and partial transcription of its colophon, which served as an important source for Ina Bagdiant McCabe to bring up interesting historical facts [15].

LA 152 offers the most extensive colophon compared to the other three manuscripts. From it, we learn that this manuscript was commissioned by Xoĵa Nazar, perhaps the most notable and the wealthiest Armenian of his time, in New Julfa, whose name was referred to in the colophon by an epithet “iřxanac' iřxan” (prince of princes). Xoĵa Nazar sought for the best masters of his time, finding a skilled scribe and probably also an illuminator Hakob, in Constantinople, whom he commissioned to copy the Bible.

At the beginning of the Bible, there is a well-known poem by Step'anos Jik' Ĵowĵayec'i, the scribe, illuminator, and poet from New Julfa. The poem is rather long (four hundred lines in total) and presents the content of the books of the Old and New Testaments in rhymed verses. The manuscript also contains many short notes left by Hakob the scribe. The main colophon is at the end of the manuscript. A brief glorifying section is followed by a lengthy text that presents a passage summarized in twelve points and filled with references to Sacred Texts, completed by the text on motivation and desire for producing such Sacred Book. Then, the colophon introduces the people related to the manuscript, the leaders of the time, and contemporary events. A central place is given to the commissioner/patron of the manuscript and his family members, with continuous remembrances and abundant praise. The multi-layered structure and rich vocabulary of this colophon testify to the exceptional talent and literacy of the scribe. Perhaps it is not in vain that Xoĵa Nazar looked for him in Constantinople

and patiently waited for the completion of his Bible in New Julfa. This colophon is an important literary monument in terms of both historical and aesthetic values, deserving a deeper study.

The main colophon in the last pages is followed by brief notes added for various years by different hands, indicating them to be the descendants of Xoĵa Nazar, up to some point, when the notes stop appearing.

The latest colophon in this manuscript appears in a different and hard-to-decipher handwriting, indicating the new owners of the Bible to be the family named Šahamireanc', living in T'iflis (present-day Tbilisi, Georgia), and owning the manuscript for generations. Someone from this family left this colophon in Madras (present-day Chennai, India) in 1776.

Gospel LA 216

The Gospel LA 216 has a relatively lengthy colophon from which we learn that this small-scale manuscript, full of vivid illuminations, was produced in New Julfa. It resulted from a collaboration of talented scribe Gaspar and famous New Julfan artist Hayrapet. Gaspar's colophon appears at the end of the manuscript, while Hayrapet left his name under the illustrations of the Evangelist portraits. We learn also about the commissioner of this Gospel, a woman named Etsabert', who desired this manuscript for the memory of herself and her parents. As usual, the colophon gives details on contemporary historical events and names, together with abundant references to Etsabert' and all the family members related to her.

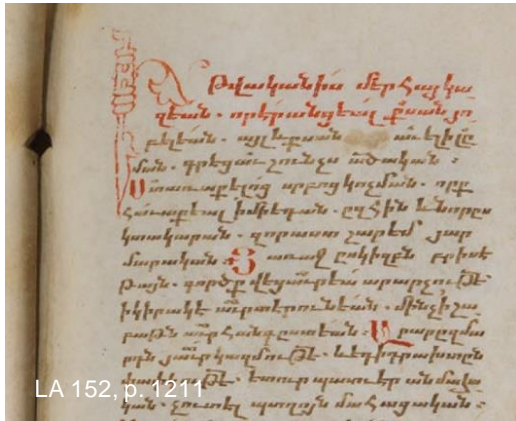
Gospel LA 193

The Gospel LA 193 possesses a brief colophon (six lines) from which we retrieve only the name of the scribe Nikoĵayos. Our comparative studies demonstrate that the manuscript is the work of Nikoĵayos Melanavor, a prominent scribe, and artist in Crimea during the seventeenth century. No other details are known from this colophon.

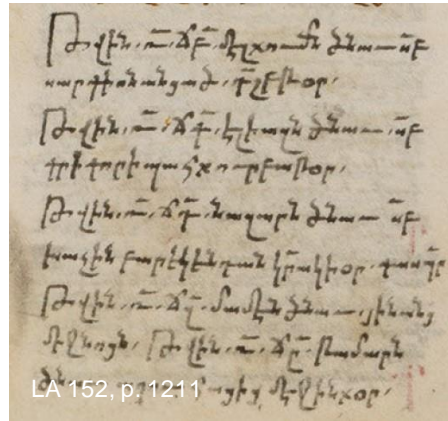
A late inscription with different handwriting that indicates the paleography of modern centuries was found on the last blank folios. It mentions someone named Sargis and his family members, seemingly asking to remember him for the silver of the manuscript (some letters are erased). We suppose that Sargis might be the master who prepared two silver plates that are attached as outer covers for the manuscript, with a desire to be remembered in this precious Gospel as well.

Gospel LA 253

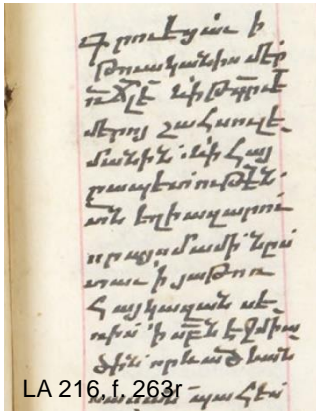
The Gospel LA 253 has no colophon but a late inscription, mentioning the names of probably the later owners, Ôvanes and Nigar xat'own, and the year 1820.



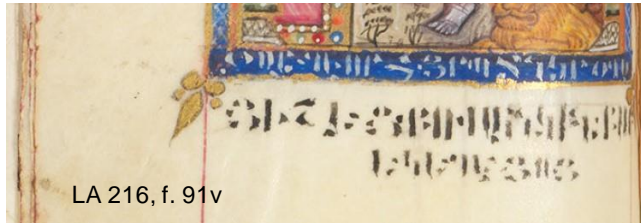
LA 152, p. 121r



LA 152, p. 121v



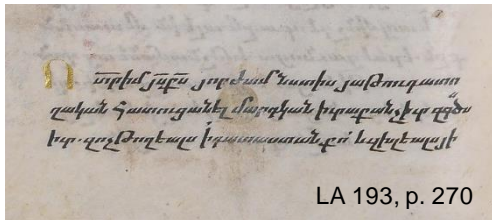
LA 216, f. 263r



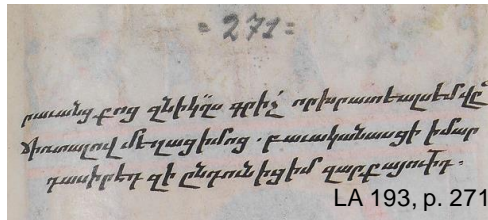
LA 216, f. 91v



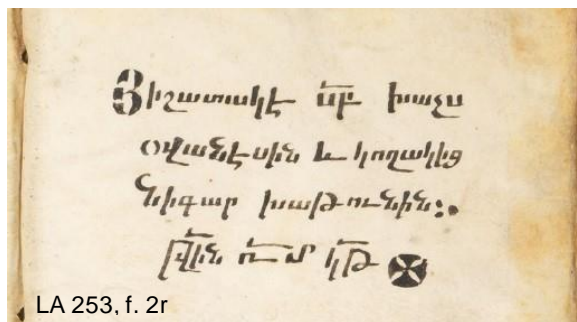
LA 216, f. 141v



LA 193, p. 270



LA 193, p. 271



LA 253, f. 2r

Figure 9. Fragments of colophons and annotations for each manuscript.

2.3.3. Scribes, Artists, Patrons

Preserved colophons and late annotations in the Gulbenkian Armenian manuscripts acknowledge us the names of the scribes, artists, patrons, and later owners, that have been associated with the fate of these manuscripts during certain periods of time. We tried to trace as closely as possible the identity of these individuals, who were once the creators and possessors of this precious heritage.

Bible LA 152 provides several names in its lengthy colophon. The scribe and probably the artist of this Bible manuscript is Hakob dpir. To not confuse his identity with other scribes of the same period with the same name, we took some personal details from the colophon left by Hakob himself. Thus, his father is named Pałtasar, and his mother, Howstiane. Using this pattern, we looked for Hakob in the catalogs of seventeenth-century Armenian manuscripts and colophons [24-25]. These sources connect the scribal activities of Hakob dpir with the church of St. Nikołayos. It seems there were two Armenian churches named St. Nikołayos in Constantinople, and one of them had a school or *scriptorium* where the manuscripts were copied [26]. We are not aware of more details, but it will be interesting to further explore the fate of this scriptorial center and the names connected to it. Based on catalog data, we did a tentative reconstruction of the chronology of the manuscripts copied by scribe Hakob. It ranges roughly between the years 1616 and 1657, resulting in a rich legacy of manuscripts. An interesting fact we have noted in the colophons is that with years Hakob dpir becomes Hakob sarkavag, which indicates that his clerical status has been changed to a higher one.

Probably the most prominent name that we encounter in LA 152 is that of Xođa Nazar, the patron and first owner of the Bible manuscript. His personality was thoroughly explored in several studies [15-16]. He was the wealthiest and mighty Armenian of his time, and the leader of the New Julfan community, in Isfahan. Nazar, the son of Xođa Xač'ik, was a descendant of the first deported by Shah Abbas Armenians from historical Julfa. In a very short period, he managed to become a beloved and trusted agent of the Persian Shah, who granted him the monopoly of the Empire's silk trade. The palace-houses of Xođa Nazar and the main street of New Julfa named after him were the evidence of his affluent position. Nazar addressed his advantageous situation not only to his personal growing fortune but also to the prosperity of the New Julfan community. Armenian catalog data [24-25] indicates numerous manuscripts commissioned by him. Xođa Nazar's large family is remembered in the lengthy colophon of LA 152 by each member and ancestor. The names of his generations that subsequently possessed the Bible appear in chronological order up to the year 1701. Each newly added name declares the birth of a new family member, asserting the registration of Nazar's genealogy in this sacred book.

Gospel LA 193 in its short colophon provides the name of Nikołayos, who turned out to be the well-known scribe and artist Nikołayos or Nikołos, known also as Nikołayos Melanavor. He was active during 1647-1693, in the *scriptoria* of Crimea, and his name is

mainly connected with St. Sargis Armenian church of Kaffa. Nikoṭayos left a substantial legacy of illuminated manuscripts. His main inspiration source was medieval Armenian and Latin art [27].

Gospel LA 216 conveys to us the names of the scribe, artist, and patron. The scribe of this Gospel manuscript is Gaspar. He was active in the New Julfan *scriptoria* during the seventeenth century. There are several manuscripts produced in this period that mention Gaspar's contribution as a scribe [24-25]. The artist of LA 216 left his name not in the main colophon, but under the full-page portraits of Evangelists. The name is that of Hayrapet, known also as Herapet or Hayrapet ǰowṭayec'i. Hayrapet was one of the productive artists of his time in the New Julfan *scriptoria*. His name appears in numerous manuscripts produced in New Julfa during the seventeenth century, within the years 1639-1691. Hayrapet transmitted his knowledge to his students [27:328-339, 24-25]. We are even lucky to have his self-portrait left in a manuscript (Matenadaran MS 189, Bible, 1649, Isfahan, f. 469r). The patron for LA 216 is a woman named Eṭsabert'. We do not know the details of her identity. Probably she was a member of one of the New Julfan wealthy families, who could afford the commission of such a sumptuous manuscript. Her family links appear with mentions of her parents, husband, and numerous names for her sons and daughters.

Gospel LA 253 does not provide any name from the time of its production, as the main colophon is missing from this manuscript, probably gone together with missing folios. However, there are the names of probably later owners of this Gospel, Ôvanes and Nigar xat'own. Regarding their identity, there is no more information.

2.4. References

- [1] Calouste Gulbenkian Museum (1982). *Museum Catalogue*, Fundação Calouste Gulbenkian, Lisbon, p. 5.
- [2] Perdigão, J. A. (1969). *Calouste Gulbenkian Coleccionador*. Fundação Calouste Gulbenkian, Lisbon, p. 215-227.
- [3] Pereira, J. C. B. (1999). *Calouste Gulbenkian: The Collector as Creator. Only the Best: Masterpieces of Calouste Gulbenkian Museum*, Lisbon. K. Baetjer, J. D. Draper (eds.), *The Metropolitan Museum of Art*, New York, p. 3.
- [4] Pereira, J. C. B. (2011). *Museu Calouste Gulbenkian*. Fundação Calouste Gulbenkian, Lisbon.
- [5] *Fundação Calouste Gulbenkian 1956-1981. 25 Anos* (1983). Fundação Calouste Gulbenkian, Lisbon.
- [6] Gulbenkian Archives (Fundação Calouste Gulbenkian, Arquivos Gulbenkian), Lisbon, doc. no. MCG 01470, MCG 02129, MCG 02085, personal consultation, October 2019.
- [7] Gulbenkian Archives (Fundação Calouste Gulbenkian, Arquivos Gulbenkian), Lisbon, doc. no. MCG 04428, dossier of Sirarpie Der Nersessian, 1968, personal consultation, October 2019.
- [8] Kouymjian, A., Kouymjian, D. (1974). *The Museum Calouste Built*. *Saudi Aramco World*, 9/10, p. 6-11 (p.7).
- [9] Der Nersessian, S. (1977). *L'Art Arménien. Art e métiers graphiques*, Paris, p. 233-236.
- [10] Arakelyan, M. (2011). *Sixteenth and Seventeenth Century Armenian Illuminated Manuscripts from Galicia, Podillia, and Bukovyna*. In: *Armenian-Ukrainian Historical Contacts. Papers of the International Conference Held in Lviv*, K. Bardakjian, F. Sysyn, A. Yasinovskyi (eds.), Lviv, p. 93-112 (p. 103).
- [11] Ribeiro, M. Q. (1999). *Only the Best: Masterpieces of the Calouste Gulbenkian Museum*, Lisbon. K. Baetjer, J. D. Draper (eds.), *The Metropolitan Museum of Art*, New York, p. 21-22, no. 4.
- [12] Nersessian, V. (2001). *Treasures from the Ark: 1700 Years of Armenian Christian Art*. The British Library, London, p. 188-189, no. 117.
- [13] Rodrigues, J. (2019). *The Rise of Islamic Art, 1869-1939*. J. Hallett (ed.), Calouste Gulbenkian Foundation, Lisbon, p. 117-118.
- [14] Merian, S. L. (2018). *Armenian Scriptoria in Constantinople. Armenian Scriptoria in New Julfa*. In: *Armenia: Art, Religion, and Trade in the Middle Ages*, H. C. Evans (ed.), *The Metropolitan Museum of Art*, New York, p. 235, 272, 238-40, no. 109.

- [15] Baghdiantz McCabe, I. a) (1998-2000) An Armenian King in Exile: New Julfa's Shah through a Persian Edict and an Armenian Bible. *Revue des Études Arméniennes* 27, p. 321-328; b) (2010) The Armenian Bible of 1623 and the Merchant Communities of Constantinople and New Julfa. In: *Armenian Constantinople*, S. Payaslian, R. G. Hovhannisian (eds.), Costa Mesa, p. 183-199; c) (2018) Connections Between Constantinople and New Julfa. In: *Armenia: Art, Religion, and Trade in the Middle Ages*, H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 232-233.
- [16] Baghdiantz McCabe, I., (1994-95). Silk and Silver: The Trade and Organization of New Julfa at the End of the Seventeenth Century. *Revue des Études Arméniennes* 25, p. 389-416.
- [17] Aslanian, S. (2011). *From the Indian Ocean to the Mediterranean: The Global Trade Networks of Armenian Merchants from New Julfa*. University of California Press, Los Angeles.
- [18] Goshgarian, R. (2018). Armenian Global Connections in the Early Modern Period. In: *Armenia: Art, Religion and, Trade in the Middle Ages*, H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 173.
- [19] van Lint, Th. M. (2015). The Armenian People, their History and Culture. In: *Armenia: Masterpieces from an Enduring Culture*, Th. M. van Lint, R. Meyer (eds.), Bodleian Library, University of Oxford, p. 23.
- [20] Abrahamyan, A. (1964). *Hamaṛot owrvagic hay gaṭ' avayreri patmowt' yan* [A Brief Outline of the History of Armenian Settlements]. Vol. 1, Erewan, p. 55, 75-90.
- [21] Evans, H. C., Merian, S. L. (1994). The Final Centuries: Armenian Manuscripts of the Diaspora. In: *Treasures in Heaven: Armenian Illuminated Manuscripts*. Th. F. Mathews, R. S. Wieck (eds.), The Pierpont Morgan Library and Princeton University Press, York, NY, Princeton, NJ, p. 103 -124.
- [22] Rydzkowska-Kozak, J. (2018). Armenians in Crimea and Italy. In: *Armenia: Art, Religion and, Trade in the Middle Ages*, H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 164.
- [23] Merian, S. L. (2015). Illuminated Manuscripts: The Collection in Context. In: *Armenia: Masterpieces from an Enduring Culture*, Th. M. van Lint, R. Meyer (eds.), Bodleian Library, University of Oxford, p. 55.
- [24] Mayr C'owc'ak hayeren jeṛagrac' Maštoc' i anvan Matenadarani [General Catalogue of Armenian Manuscripts of Maštoc' Matenadaran] (1984-2019). Vols. 1-10, Matenadaran, Erewan.

- [25] Hakobyan, V., Hovhannisyan, A. (1974-1984). Hayeren jeřagreri Ê dari hiřatakaraner [Colophons of Armenian Manuscripts, XVII century]. Vols. 1-3, Erewan.
- [26] Xařatyan, A. (2007). Kostandnowpolsi hay gałt'ôřaxə, XV-XVII darer [The Armenian Community of Constantinople, XV-XVII centuries]. Erewan State University, Erewan, p. 114-118.
- [27] Gevorgyan, A. (1998). Hay manrankari 'ner, matenagitowt'iwn, IX-XIX dd. [Armenian miniature painters, Bibliography, IX-XIX centuries]. Cairo, p. 594-608.



CHAPTER 3

Detail, bird-ornament, LA 253, f. 56r

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Interdisciplinary Study of a Precious Armenian Heritage. In: Art of the Armenian Diaspora (World
Art Studies), W. Deluga (ed.), Polish Institute of World Art Studies & Tako Publishing House,
Warsaw-Toruń, Vol. 20, p. 59–75.*

3. ART HISTORY

This chapter reflects our art historical studies related to the manuscripts under the scope. It is divided into two parts, where the first one introduces the study of the Bible manuscript LA 152, while the second part is dedicated to three Gospel manuscripts, LA 193, LA 216, and LA 253. In this chapter, we explore the art of these manuscripts through a comparative approach. It tries to give a comprehensive image of the artistic traditions practiced in three different *scriptoria* and cultural milieus.

3.1. The Gulbenkian Bible (17th c.): an Interdisciplinary Study of a Precious Armenian Heritage

3.1.1. Introduction

Illuminated manuscripts have always been an important part of Armenian art during the long historical course of ancient, medieval, and early modern periods. Nowadays Armenian manuscripts are preserved as valuable objects of cultural heritage. The main depositories of these manuscripts are the Mashtots Institute of Ancient Manuscripts in Yerevan, the Library of Armenian Patriarchate in Jerusalem, the Library of San Lazzaro Mekhitarist Congregation in Venice and its respective branch in Vienna, and the Armenian Catholic Monastery in Bzommar, Lebanon. There are also Armenian manuscripts spread in the collections throughout Europe, America, and the Middle East. These handwritten and illuminated treasures are a source of information related to literary and scientific subjects, art history, materials, and techniques used in their production. They are textual and artistic testimonies of social, political, and cultural developments of Armenian history. The study and preservation of these manuscripts is an important task and requires an interdisciplinary collaboration of art historians and conservation scientists.

This paper presents new insights into the Armenian Bible codex LA 152, currently housed at the Gulbenkian Museum in Lisbon. We initiate it by introducing the historical period (17th c.) and the environment of its production. Next, we summarize what has been published regarding the manuscript, and its acquisition history and we present the codicological description of it. We extend our research to a systematic analysis of the colophons and their important notes, which bring new evidence for the history of entangled connections of its owners and creators. Finally, our comparative iconographic study discusses the Armenian and Western artistic influences and the possible inspiration sources for the illuminations. To accomplish this work, we have sourced archival material, numerous manuscript catalogs and images, and studies on colophons and the material itself. This is the

first preliminary report on one of the Armenian manuscripts of the Gulbenkian collection, being realized in the framework of the doctoral project "Between Tradition and Innovation: An Interdisciplinary Approach in the Study of Seventeenth-Century Armenian Manuscripts" awarded by the Portuguese Science Foundation (FCT-MCTES).

3.1.2. The Gulbenkian Bible: History, Time, and Environment

One of the artworks of the Gulbenkian Museum (Lisbon) is the codex LA 152. This and illuminated manuscript is an Armenian Bible commissioned by Xoĵa Nazar during the first decades of 17th c. and copied in Constantinople¹. It was owned by Armenian families until the end of 18th c., after that there is a hiatus until we found it in the Sotheby's auction. It was acquired by Calouste Gulbenkian in November 1926 at Sotheby's of London from Sir Malcolm MacGregor of MacGregor through intermediary Bernard Quaritch. Gulbenkian's will expressed his desire to reunite his artworks or his "friends of a lifetime" under one roof in Lisbon. The transportation of his entire collection from London, Paris, and Washington to Portugal was held during 1959-1960 [1]. While in the 1960s Museum of Gulbenkian was being constructed in Lisbon, his artworks were at the Palácio Marquês de Pombal in Oeiras². Since 1969 the Bible is housed at the Gulbenkian collection in Lisbon.

The first description of this Bible was made by eminent art historian Sirarpie Der Nersessian [2] who was invited by Maria Teresa Gomes Ferreira, the Museum's first director, to study the Armenian manuscripts housed there. One of the first reflections on those manuscripts and the Gulbenkian collection in general was rendered by renowned scholars Angèle and Dickran Kouymjian, in 1974. The exhibition of the Bible created further opportunities for scholarly studies by Maria Queiroz Ribeiro [4], Vrej Nersessian [5], Ina Baghdiantz McCabe [6-9], Sylvie L. Merian [10], Jorge Rodrigues [11], and Mikayel Arakelyan [12]. Based on above mentioned studies, we have completed an assessment form of LA 152 that includes the exact list of its textual content and illuminations.

Gulbenkian Bible was produced in the 17th c., during a period of cultural revival in the Armenian diaspora communities. From the 16th c. up to the beginning of the 19th c. Armenia has been continuously subjected to Ottoman-Safavid wars. This situation led to the settlement of several Armenian communities in Constantinople, New Julfa, Kaffa, and Lviv³. Between

¹ See the detailed discussion under the title "Colophons and Annotations".

² The big flood of Lisbon, in 1968, affected many artworks of Gulbenkian collection that were kept at Palácio Pombal, in the safe deposit of ground floor. Manuscript LA 152 does not seem to have been damaged by water.

³ Armenian presence can be dated in Constantinople (Istanbul in present-day Turkey) by 10th c., in New Julfa (Armenian quarter in Isfahan, Iran) by 17th c., in Kaffa (known also as Caffa or Theodosia, town in Crimea) by 11th c., and in Lviv (known also as Lvov or Leopoldis, city in Ukraine) by 13th c. (see A. G. Abrahamyan, "Hama ʔot

these communities and European port cities, the goods were circulated by trade agents, the ideas and knowledge by church intellectuals or priests, and the new artistic forms and practices by artists and craftsmen. Arts and crafts were flourishing due to the patronage of wealthy merchants [13]. Several Armenian monasteries were active with their schools and *scriptoria*.

Constantinople, during the seventeenth century, was one of the last prospering centers for Armenian manuscript art that bears influences from traditional Armenian schools, particularly from Cilicia, and the Crimean diaspora, as well as from Western art [14-17]. But why the Armenian manuscripts were copied and illuminated by hand at that time? Merian describes this process as an "unusual phenomenon: the transition from printed book to manuscript" [17]. The reason has its political and social background. After the Ottoman conquest of Constantinople Armenians, as non-Muslim subjects, had several restrictions in their daily life, including the printing activities. This situation, possibly, stimulated the continuity of manuscript traditions. This is a period when the dramatic decline of manuscript production in the 16th c. Armenian *scriptoria* was followed by a sudden increase [18]. Religious and secular literature was being copied, with the majority of Bible manuscripts, highly demanded by wealthy families. Our quest for dated and complete Armenian Bibles produced in Constantinople during 1610-1670 [19] identified 13 Bibles (Table 2). Der Nersessian indicated [14] that the art of the Bibles produced in Constantinople was greatly appreciated so that many of them served as model books in other Armenian schools of illumination. As will be next discussed, this theory can be definitely applied to Gulbenkian Bible.

3.1.3. Codicology

The codex dimensions are 224x165 mm, and the writing support is fine parchment of 609 folios, paginated with a pencil at the bottom margin and forming 1212 written pages and 6 free endleaves (2 at the left, 4 at the right). The edges of the text block bear a solid red coloring. 12-folio gatherings are marked with Armenian letters at the beginning and end of each gathering. V-shaped recesses are visible between the gatherings. The binding has embroidered beige-toned endbands raised in both the head and tail edges of the spine. The manuscript is protected by a dark brown leather binding on wooden boards. The inner face of the boards is lined with blue fabric doublure. The inner face of the right board holds traces of three leather fastenings. The outer face of the leather binding bears blind-tooled decorations⁴ (Figure 10).

urvagic hay gal't'avayreri patmut'yan" (Brief Outline of History of Armenian Communities), vol. I, Yerevan 1964: 55, 160, 203, 248).

⁴ We thank Dr. Rita Araújo for her precious advice.

Table 2. Complete and dated Armenian Bibles produced in Constantinople during 1610-1670.

	Collection abbrev. / Inv. no.	Date	Workshop	Scribe	Artist
1	MM / MS 186	1611	S. Gevorg	Mik'ael Toxatec'i, others	the scribe
2	SJL / MS 3043	1617-1622	S. Harut'yun / Jerusalem, S. Nikolayos / Constantinople	Grigor vardapet Daranalets'i	Xac'atur abela Kesarac'i
3	SJL / MS 428	1620	S. Nikolayos / Constantinople	Hakob dpir	Xach'atur abela
4	MCG / MS LA152	1623	-- / Constantinople	Hakob dpir, Step'anos (gcof)	--
5	BV / MS Arm. 1	1625	-- / Constantinople	Mik'ael T'oxat'ec'i	--
6	ML / MS 1507 (13)	1635	-- / Constantinople	--	--
7	SJL / MS 1932	1640	-- / Constantinople	Mik'ael	--
8	MM / MS 2669	1641	S. Nikolayos, S. Sargis / Constantinople	Astvacatur dpir, Grigor (gcagrof)	Astvacatur dpir
9	MM / MS 188	1641-43	S. Hreshtakapetac' / Constantinople	Hakob dpir Aknec'i	Hakob k'ahana Aknec'i
10	SJL / MS 1927	1649	-- / Constantinople	Astvacatur dpir	Mahtesi Lazaros
11	MM / MS 202	before 1651, 1666	-- / Constantinople, -- / Tigranakert/Amida	Step'anos dpir, others	--
12	MM / MS 348	1654-1660	St. Sargis / Constantinople	T'amur dpir Aknec'i	Markos
13	SJL / MS 2561	1670	-- / Constantinople	Meliton erac', Elia, Azaria	--



Figure 10. The left cover of the leather binding and the inner part of the right cover, MS LA 152, Armenian Bible, 1623. © Gulbenkian Museum.

Most probably the binding of the Gulbenkian Bible is original. According to Merian [20], traditional Armenian binding includes "supported" sewing of gatherings, "raised" endbands in a distinctive chevron weave, red covered edges of textblock, wooden boards lined with fabric and covered with leather, very often with a leather fore-edge flap in the right board, blind-tooled decorations with most common patterns of stepped cross and braided rectangle on the left and right covers respectively. Based on it, we may conclude that the binding of LA 152 bears typical for Armenian style decorations: a braided cross on the left cover, and a decorated rectangle on the right cover, both with braided frames. Kouymjian proposes [21] that this cross-rectangle motif symbolizes the themes of Crucifixion and Resurrection respectively, in which the rectangle may represent the empty tomb of risen Christ.

The text is written in Armenian bolorgir in two columns, 47 lines each of them. The script is in black ink which turns brown in some places. Red, gold, and blue are used for rubrications and nomina sacra. A bright palette of color paints is used in full-page illuminations, in which the main colors are blue and different hues of red. Gold is lavishly used in this manuscript for both backgrounds and ornaments. In general, the manuscript is in good conservation condition, bearing traces of its use in the past, which is detectable especially in the outer edges of the bookblock.

3.1.4. Colophons and Annotations

The colophons and annotations of the Gulbenkian Bible help us to unveil the story of this manuscript. As will be next detailed, Xoĵa Nazar was the patron of this Bible and was a prominent merchant of New Julfa. In this respect, the prior studies of Baghdiantz and Merian [6-10] are fundamental. Baghdiantz refers mostly to Xoĵa Nazar, in the context of her research on Armenian merchant communities between Constantinople and New Julfa. Merian is one of the first to introduce the colophons of LA 152 and to give valuable insides into the *scriptoria* of Constantinople.

On page 1 there is a small poem in the lower left corner of the blank page, telling that the verses and colophons of the Bible were written by Step'anos Erec', son of Step'anos, on request of Melik' Aĵa, in the year of 1621. We suppose that Melik' Aĵa could be a person connected with Xoĵa Nazar and acting on his part to order the manuscript. On pages 2-6, we found a summary of the Bible content written in verses by the scribe, the same Step'anos (Dzik' Step'anos), who features himself in the last sentence (p. 6) as unworthy and fallible that takes again the initiative to write the Holy Scriptures. In this summary, on page 6, Xoĵa Nazar is described as the honorable one who commissioned the Bible. Starting from page 137 and until the end of the Bible, the name of Hakob appears for the scribe, left in small annotations on several pages. He begs to remember sinful Hakob, his father Baĵdasar, and his mother Hustianeh for their redemption, and may God have mercy on those who remember them. An

extensive colophon (pp. 1208-1212) is due to the completion of the book and contains many interesting details. The colophon tells Xoĵa Nazar's personal story and the historical events that happened at that time. The deportation of Armenians from their homeland to Iran by Shah Abbas in 1604 is described, how they settled in Isfahan, rebuilt their houses, and named the place Nor Jugha (New Julfa). It continues, expressing Nazar's will to own a Bible, how he comes to know about a skillful scribe working in Constantinople, and delegates someone to order the copy (p. 1210). The work was concluded by scribe Hakob in the year 1623, and the patron received his Bible in New Julfa in 1629, the year of the death of Shah Abbas. It is important to remember that Constantinople and New Julfa during the 17th century were two important centers of Armenian life, being in constant dialogue through trade and manuscript production [9]. The colophon continues with more details on further events and Nazar's participation in them, remembering many names and facts. It mentions one more time the names of all his family members and relatives. Only in the last phrase, we see again the name of Step'anos, as on the first page, asking to remember him (p. 1211). On the last page 1212, after the interruption of genealogical registration of Xoĵa Nazar's family, a new annotation with different handwriting appears, indicating that the Bible pertained to the family Shahamirian from T'iflis (Tbilisi). The last date on this page is 1796.

There are numerous annotations left by the scribe, mostly merged in the text and it is not easy to find them unless one reads carefully. Previous observations of the Gulbenkian Bible [2, 4, 5, 10] identify Hakob as the scribe of this manuscript. Yet, we assume the participation of two individuals from Constantinople and New Julfa, even so, relating the manuscript to the Constantinople workshop. Most probably the major part of the text was copied by Hakob, while Step'anos has a small participation in it, maybe in the way of poetic verses requested by the patron. The scribe Hakob or Hakob dpir (deacon) seems to be one of the active copyists in Constantinople of 17th c., as his name appears in many manuscripts, Bibles, and not only. Our study of 17th c. Armenian colophons show his connection with the *scriptorium* of S. Nikolayos Armenian church. In one of his studies [12] Arakelyan mentions Hakob as the scribe and artist of two Bibles produced between Constantinople and New Julfa during 1623-29 (Lisbon MS LA 152) and 1625-27 (Isfahan MS 96/8), emphasizing the presence of invited craftsmen and artists in the newly formed community of New Julfa. We could not find in the manuscript the name of the artist. We can assume that the same Hakob or Step'anos might have worked also on miniatures, but it is still a hypothesis.

A little more is known about Step'anos [22], whose name appears in the colophons. He was born in historical Juĵa (Julfa) and was part of a group of the first Armenians deported by Shah Abbas to Isfahan/New Julfa. The priest Step'anos was a scribe, painter, and poet of ditties. From 1608 to 1637 several manuscripts, mostly Gospels, have been copied and illuminated by Step'anos in New Julfa, Aleppo, Jerusalem, possibly during his pilgrimages. Some of his colophons go beyond the most common annotations, as they are written in Step'anos's poetic verses and sometimes contain his art-theoretical commentaries. A good

example of the latter is the poem/commentary on *xorans* (Canon Tables) [23] as a part of the Gospel colophon written by Step'anos in 1623. This insight into Step'anos's activity was driven by our supposition that the Gulbenkian Bible might have been copied in Constantinople by scribe Hakob and after illuminated in New Julfa by Dzik' Step'anos or, concerning the fact that Step'anos was moving from place to place during 1619-1637, there is also the probability that he has worked on illuminations of the Bible in Constantinople. But this is still doubtful because we did not find any colophon registration for his stay at Constantinople, unlike for Aleppo, Jerusalem, or Van. This tangle increases our curiosity even more, to find out who is the painter of this sumptuous Bible. Moreover, almost the same scenario of colophons appears in the Bible (Jerusalem MS 428) copied in Constantinople in 1620 [24]. The main colophon states that the scribe is Hakob, the painter is Xac'atur, and there are almost the same poetic verses by Step'anos.

Based on above mentioned observations, we resume that Hakob from Constantinople is the main scribe of this manuscript and emphasize the participation of Step'anos from New Julfa at some point in its realization as a scribe or painter. In the last phrase of the main colophon (p. 1211) there is a modest reminder, this time not in verses, to remember the "Step'anos gcołs" as well. Gcoł (գժող) in a direct translation means someone who draws the lines or sketches. Many scribes use this epithet in Armenian colophons, earlier meanings and variations of which include the "scribe", "copyist", "illustrator" or "drawer" [25-26].

The main patron of the manuscript is Xođa Nazar, whose name is continuously mentioned, especially in the main colophon. His long personal story presents him as one of the most important persons of Isfahan/New Julfa and details his activities for the Armenian community. At the same time, we are introduced to the life of the Armenian people in the scenario of historical events, such as the deportations of Armenians to Iran because of long-lasting conflict between Ottoman and Safavid powers, the organization of Armenian life in Isfahan, the death of Shah Abbas, and new developments in Armenian homeland. The last colophon seems to be a small chronology of that period, with carefully assigned dates, places, and names of persons. Apart from this, we receive information about the patron's family and his relatives. Colophon restates several times to remember Xođa Nazar and his family and to have mercy on them. This indicates the value of a manuscript, especially the Bible, for an Armenian, as a too important religious object, a guarantee of the salvation of his soul and all his family members.

Xođa Nazar was one of the most prominent merchants of New Julfa, a governor of a community of displaced Armenians in Iran, appointed by the Shah and kept this hereditary position in his family for generations. This wealthiest man was the first intermediary between the Shah and the Armenians, and it is not vain to find his name in the colophon accompanied by the honorific "prince of princes". He was one of the financial pillars of Shah's silk trade. The extensive history of Xođa Nazar and his family has its beautifully detailed description in the works of Baghdiantz [6-9]. Xođa was the title given to Armenians with big financial capital

and involved in local and international mercantile deals. They were favored by Shah as agile agents of Persian trade extended into the East and West. The case of Xoĵa Nazar is a brilliant example to characterize the New Julfan community: family values, internal and external social connections, patronage of art, and religious establishments based on the power of wealthy fortune and acceptable political conditions. This tradition is nicely continued by Xoĵa Nazar's descendants, most precisely, by his son Xoĵa Safar, who commissioned a Bible as well (Jerusalem MS 1934), that was completed in 1643-46 in New Julfa [27].

This manuscript is a brilliant example of the value that the Bible had in the life of an Armenian family. Of course, it indicates the economic power of Xoĵa Nazar and his family which could afford to have this kind of luxurious book. But there were other hidden motivations behind the materiality. Being connected to the Christian faith was highly essential for Armenians living in Muslim reality. Handwritten religious books were intermediaries for dislocated Armenians between their identity and lost homeland, acting as safety guarantees. The other peculiar process is a kind of conversion of those religious books into family books. The example of this Bible shows how it passes through generations, how the names or events were being registered in this manuscript up to some point when the owners change and the new chronology from a new family appears. And no matter for what reason, be it salvation in Heaven, family traditions, religious values, or social status, it is amazing to follow the immense belief of those generations to be safeguarded in the pages of this Bible.

To conclude, there are many points in the route of the Gulbenkian Bible we cannot explain. For instance, where was it kept, or by whom was it owned after Xoĵa Nazar's and Shahamirian families (the last date registered by the Shahamirian family is 1796)? Which trajectories it has crossed before being sold in London and housed in Lisbon? At this point, we leave those intriguing riddles as open questions.

3.1.5. Art of Illuminations

The Gulbenkian Bible is a luxurious and exceptional example of a Constantinople school. Some studies suggested [15:175, 5] that it was copied in Constantinople and later delivered to Isfahan/New Julfa, where it served as a model book and was copied by local artists. In the first two decades of the 17th c. the newly established Armenian community of New Julfa had barely formed its artistic life [28]. Therefore, the prominent Armenian merchants of New Julfa, such as Xoĵa Nazar, commissioned family Bibles in Constantinople, where the *scriptoria* were active. Our comparative observation of a group of 17th c. Armenian Bibles led us to think they share a common iconography. These observations are an ongoing work, for which other illuminated Bibles will be studied and compared.

The content of the Gulbenkian Bible consists of biblical scriptures of the Old and New Testaments. The organized and harmonic structure of the text-image relation in this

manuscript demonstrates the ability of the illuminator and the tradition of the ancient masters. Its iconographic program includes full-page and column miniatures, decorated title pages, and marginalia. Their distribution in the text facilitates the reading: main books open with fully decorated title pages; each chapter opens with rubricated title, headband, and ornated initial followed by incipit in red, blue, or gold. The decorative elements of rectangular headbands, ornated initials, and marginalia are present in the entire manuscript (Figure 11). In several pages, the *nomina sacra* are written in red or gold but this is not typical for the whole text. Initials and incipits are majuscule with zoomorphic and anthropomorphic letters. Rectangular headbands bear interlaced vegetal patterns. Title pages are composed of lavishly decorated headpieces in the form of arcs, together with incipit and marginalia. Plentiful marginal decorations are mostly long-shaped compositions of palmettes and vegetal forms or figures of saints and prophets. The miniatures incorporated in one of the text columns are mostly portraits of biblical characters. The figures have smooth lines and volumes, the faces are white-toned and slightly lucent. A rich palette of colors embellishes the miniatures with red, blue, green, yellow, and brown, with dominance of red, intense blue, and different hues of purple and rose. Gold is used for backgrounds of portraits and carpet patterns of headpieces. Paints have brilliant appearances and well-preserved colors. The rich patterns of lavishly decorated title pages, vegetal and zoomorphic motifs, and interlaced forms of letters in this Bible are more than familiar with medieval Armenian illuminations.



Figure 11. Decorative illuminations. MS LA 152, from left to right: pp. 588, 631, 795, Armenian Bible, 1623. © Gulbenkian Museum.

Nine fully illuminated pages come to attest to the strong aesthetical quality of this Bible. The full-page illumination of The Book of Genesis represents narrative scenes of Creation followed by its title-page with scenes of Revelation (pp. 13-14), next are title-pages of The Book of Psalms (p. 610) and The Book of Proverbs (p. 662), title-pages of Four Evangelists (pp. 950, 982, 1002, 1036), portrait of Evangelist Mark (p. 981). We suggest that the iconographic program was not completed, because there are lacunas left in the text and entire blank pages,

probably expected to be illuminated later (pp. 432, 499, 712, 1035). The missing full-page portraits of Evangelists Matthew, Luke, and John further supports this conjecture.

In this paper, we would like to discuss two exceptionally beautiful and original images that open the Bible. Our quest focuses on the originality of these images: what was the source of inspiration for the illuminator? what models did he base on? Pages 13 and 14 are set to each other at the beginning of the manuscript and symbolically represent the first and the last books of the Old and New Testaments: The Book of Genesis and The Book of Revelation (Figures 12, 15). These illuminations are particularly interesting because of their iconography, not typical of Armenian manuscripts, but common for a group of Armenian Bibles produced during the 17th c. Most probably, the Gulbenkian Bible was one of the first examples in this group of Bibles, being used as a model Bible as suggested by Der Nersessian.



Figure 12. Creation Scene. Left: MS LA 152, p. 13, Armenian Bible, 1623. © Gulbenkian Museum. Right: MS Ludwig I 14, f. 2v, Armenian Bible, 1637-38. © The J. Paul Getty Museum.

The scenes of Creation are depicted on the full-page illumination that opens the Book of Genesis, on page 13 (Figure 12). The composition consists of three central registers on gold and six medallions on a blue background, adorned with a tiny red ornamental frame. It represents narrative scenes. At the top of the composition, Christ is portrayed enthroned, surrounded by symbols of the four Evangelists. His slightly leaning position and hand orientation are towards the medallions, where the scenes of six-day creation are illustrated in the following sequence: separation of four elements and two angels; creation of waters; earth

and vegetation; sky and celestial bodies; birds and fishes; animals. The three central registers represent the creation of Adam and Eve, followed by the Temptation, and the Expulsion from Paradise. In the top right corner, there is a blue-painted rectangular area which, we think, was left for some scripture. This is another reason that makes us think of the unfinished artistic work of this manuscript, unlike the later copies of it, where the same blue painted area has writings (Getty MS Ludwig I 14, f. 2v, Figure 12).

This representation of the Genesis in which the main events are depicted on three registers and medallions is quite unusual for Armenian art, and it will be interesting to determine the sources of its inspiration. So far, it was proposed that the medallions may have been introduced into Armenian iconography through the circulation of French Bibles dated from the 13th c. [14:223-224] when Franciscan and Dominican missions were frequent in the Near East and the medieval Armenian Kingdom of Cilicia was in active contact with Latin Kingdoms. The six medallions represent the creation of the world and the central area is dedicated to a human being, from his creation to expulsion from Paradise. Why was it imagined in this way? Could it be solely based on the creativity of the artist? Or other older models may be suggested?

Similar imagery is found in several Latin manuscripts, very often within decorated initials (Morgan MS M.969, f. 5v; Morgan MS M.730, f. 9r-10r; Morgan MS M.66, f. 4v; Morgan MS M.953, f. 1r; Tournai MS 1, f. 6r; Porto MS Sta Cruz 1, f. 2r). Merian also suggested the influence from Western manuscripts [10:238]. However, it is still unclear which manuscripts were used as a source of inspiration for these illuminations. We assume that the influence is likely coming from the West and reached to Armenian diaspora through the circulation of medieval manuscripts, as gifts for notable persons. Such an example is the Crusader Bible (Morgan MS M.638), created in Paris in 13th c. for Louis IX of France, later owned by Cardinal Bernard Maciejowski, Bishop of Cracow, and gifted to Shah Abbas. Creation scenes from the 14th c. Armenian manuscripts are different (Matenadaran MS 206, f. 3v; Matenadaran MS 352, f. 3v; Matenadaran MS 2627, f. 2v) [29-30], but we do not exclude their influence on Constantinopolitan or New Julfan artists.

However, the iconography presented in LA 152 is closer to Latin examples as found in manuscripts created in the Latin Kingdom of Jerusalem (Dijon MS 562, f. 32r; Arsenal MS 5211, f. 3v Figure 13).

These illuminations were probably a source of inspiration and not used to reproduce an exact copy. Other models that may be also considered are earlier examples such as the Carolingian Moutier-Grandval Bible (British MS Add. 10546, f. 5v), Romanesque Bibles known as Pantheon Bible (Vatican MS Lat. 12958, f. 4v), and Bible of Pontigny (Paris MS Latin 8823, f.1r), as well as Bible of Souvigny (Moulins MS 1, f. 4v, Figure 14)⁵.

⁵ Some of these Bibles, such as Grandval Bible (British MS Add. 10546) and Souvigny Bible (Moulins MS 1) are mentioned also by Merian [10].



Figure 13. Creation Scene. Left: MS 5211, f. 3v, Arsenal Old Testament/Acre Bible, Acre, 1250–1254, Bibliothèque de l’Arsenal, Paris. © gallica.bnf.fr / Bibliothèque nationale de France. Right: MS 562, f. 32r, Histoire Universelle, Acre, 1260–1270, Bibliothèque municipale, Dijon. © Bibliothèque municipale de Dijon.

To our belief, this full-page miniature of the Creation cycle deserves to be further studied. Up to now, ten Armenian Bibles with similar scenes have been identified, dating from 1620 to 1663 (Table The first three examples, including the Gulbenkian Bible, were made in Constantinople. At least three copies of LA 152 (1623) are known by the almost same iconography produced in New Julfa: Getty MS Ludwig I 14 (1638); Jerusalem MS 1933 (1645); Isfahan MS 15 (1) (1662) [27].

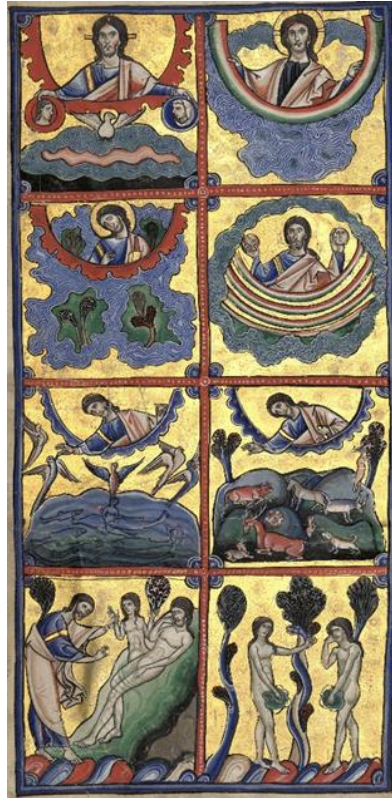


Figure 14. Creation Scene. MS 1, f. 4v, Bible de Souvigny, 1180-1200, Bibliothèque de Moulins.
© Médiathèque communautaire de Moulins.

Table 3. MSLA 152 (marked with an asterisk, no. 2) and a group of Armenian Bibles (pre- and post-copies), sharing common iconography.

Number	1	2*	3	4	5	6	7	8	9	10
Date	1620	1623	1625	1635	1637-38	1640	1645	1648	1662-63	17 th c.
Provenance	Constantinople	Constantinople	Constantinople	?	New Julfa	Constantinople	New Julfa	New Julfa	New Julfa	Constantinople
Current location	St. James, Arm. Patr. Library, Jerusalem	Calouste Gulbenkian Museum, Lisbon	Biblioteca Vaticana, Vatican	San Lazzaro, Mekhit. Library, Venice	Getty Museum, Los Angeles	St. James, Arm. Patr. Library, Jerusalem	St. James, Arm. Patr. Library, Jerusalem	St. James, Arm. Patr. Library, Jerusalem	All Saviour Armenian Cathedral Library, Isfahan	St. James, Arm. Patr. Library, Jerusalem
Inv. no.	MS 428	MS LA 152	MS Vat. Arm. 1	MS 1507 (13)	MS Ludwig I 14	MS 1932	MS 1933	MS 1928	New Julfa MS 15 (1)	MS. 501
Folios	543	609	581	--	610	567	593	622	577	579
Dimensions	230x170 mm	224x165 mm	--	--	252x180 mm	230x170 mm	270x200 mm	260x190 mm	265x203 mm	230x170 mm
Colophon/s	ff. 542r, 543v	pp. 2-6, 1208-1212	f. 580r	--	--	--	ff. 47r, 88r, 466v, 587r	ff. 444r, 620v	ff. 576v - 577r	--
Scribe/s	Hakob dpir	Hakob, Step'anos	Mik'ayel T'oxat'ec'i	--	--	Mik'ayel	Astvacatur	Markos	Markos, Hovsep', Hovhannes, Hakob	--
Artist/s	Xac'atur abela	--	--	--	Malnazar, Alap'ir	--	Hayrapet	--	--	--
Donor	Xoja from Isfahan (no name)	Xoja Nazar	--	--	Xoja Abdul	--	--	Paron Margar	Sisters Elisabet' and Sanam	--

Page 14 facing to Creation cycle is a fully illuminated title page of The Book of Genesis with imagery of the Apocalypse (Figure 15). It is adorned with a rectangle-shaped headpiece bearing curved openings and filled with a patterned background of blue, red, green, and gold colors. In the central rosette, Christ is represented in a heavenly throne sending his word to John, who is portrayed in a receiving position with a text in his hands. A descending bird is depicted parallel to John. Two blue rays arrive from the hands of Christ to twenty-four elders on both sides of the composition. At the top of the headpiece is a lion-like lamb in adorned mounting, with seraphs on both sides. The marginal decoration along the page is an interlaced palmette, completed with a cross at the top. Moses is portrayed in the bottom left corner, holding a child in one hand and a book in the other raised hand, with descending bird on it. The child holds a big serpent, curving around the feet of Moses. This composition represents the initial "I" (Armenian "Ի"), to which an ornated incipit follows: "In the beginning...".



Figure 15. Moses in the title page of the Book of Genesis. Left: MS LA 152, p. 14, Armenian Bible, 1623. © Gulbenkian Museum. Right: MS JL 1925, f. 9r, Erznka Bible, 1269-1270. © Reproduction in "Bardzr Hayk'i manrankarch'ut'yunē: ZHA-ZHD darer" (Miniature Painting of Upper Armenia: 11-14th centuries), E. Korkhmazyan, Yerevan 2015:35.

Moses is mostly related to the Book of Exodus. However, in Armenian practice, it is not unusual to paint his image at the beginning of the Book of Genesis. The latter is indicated in the several descriptions of 13-14th c. Armenian Bibles (Matenadaran MS 345, f. 6r; Matenadaran MS 353, f. 7v; Matenadaran MS 206, f. 3v; Matenadaran MS 2627, f. 2v), found in catalogs [31]. In the earliest preserved Armenian Bible of Erznka (Jerusalem MS 1925, 1269 AD) the Book of Genesis opens with a full-page miniature of Moses receiving the Tables of

the Law, likewise in the title page of it, where Moses writes the first letter "h" of the Book (Figure 15). According to Der Nersessian [29:29-33], this artistic approach of connecting Moses with the first book of the Old Testament is significant. Moses receives not only the Ten Commandments from God but also the inspiration for writing the Pentateuch. The example of the Gulbenkian Bible shows the continuity of that practice, where Moses holds the Sacred Scriptures (golden book held with a cloth) inspired by the Holy Spirit (bird or dove with halo), and a child in his lap holding a serpent, Moses's wand that transforms miraculously. We suppose that the child in this composition has either a symbolic meaning or represents Gershom, a son of Moses⁶.

The idea of opening the book of Genesis with the above-discussed composition is quite interesting. It reminds the Bible verse "For the Law was given through Moses; grace and truth came through Jesus Christ" (John 1:17), where St. John, the most beloved disciple of Jesus, absorbs heavenly secrets through the word of God. The Christ-bird-St. John combination (headpiece, p. 14) is represented in many medieval Western manuscripts, mainly Gospels [32]. There is an intriguing example of integrating the Old and New Testaments in one image, where St. John was dividing two roundels with "In principio..." from The Book of Genesis and The Book of John (Figure 16). These analogies make us think of other inspiration sources for Armenian artists, which would be interesting to further explore.



Figure 16. John the Evangelist in the guise of the Christ-Logos. Leaf added ca. 1400 to a psalter, diocese of Basel, second half of 13th c. Freiburg, Augustinermuseum, inv. no. 11735, front paste down. © Reproduction in "St. John the Devine: The Deified Evangelist in Medieval Art and Theology", J. F. Hamburger, London 2002:pl. 2.

⁶ We thank to Professor Karen Matevosyan (Matenadaran) for helping us to unravel this image.

3.1.6. Conclusion

This paper concludes our first observations of the Armenian Bible housed at the Gulbenkian Museum in Lisbon. The on-site study allowed us to describe the manuscript as a physical object and to compile the data of its assessment form. This was done to determine the completeness of the codex which is important for both conservation and textual studies. The materials used in the Bible production, such as the fine parchment, black ink, and rich palette of pigments, together with traditional leather binding are evidence of high mastery. The manuscript, in general, is in a very good conservation condition.

The thorough study of colophons allowed us to determine the main facts and figures related to the manuscript. According to colophons, the Bible was commissioned to a Constantinople workshop at the beginning of the 17th c. by a wealthy merchant from New Julfa, the Armenian Xoĵa Nazar. Later, the Bible was delivered to New Julfa and found its destination in the house of Xoĵa Nazar. For a quite long period, the Bible was owned by Armenian families, until the year 1796, when we lose the trace of its trajectory. In the 20th c. the Bible reappears in the house of another Armenian with origins in Constantinople, a man who preferred to include only the best in his collection: Calouste Sarkis Gulbenkian, a businessman, philanthropist, and art collector, as famous and rich as Xoĵa Nazar at his time. Colophons allowed us also to disclose by whom the manuscript was copied, to consider the participation of two scribes, and to discuss the possible identity of the artist.

The iconography of this Bible and its comparison with several 17th c. Armenian Bibles led us to think that this luxurious manuscript was created by skillful artists of Constantinople workshop and after served as a model book for several Bibles produced in New Julfa during the mid-17th c. Furthermore, the iconographic program represents an eclectic combination of Armenian imagery, including medieval models, with Western influences that we suggest may be found in medieval Latin manuscripts. We tried to find the continuation of artistic traditions and the emergence of new influences by reconstructing the historical background and environment, in which the manuscript was produced. Thus, we perceive the Gulbenkian Bible as a model that offers and receives influences in the process of historical dynamics. In the future, we would like to deepen the connections between the imagery of this Bible and both traditional Armenian and European artistic forms of expression and explore the influences of Cilician miniature and European printed books that have been proposed by other authors. Based on an extended analysis of medieval and early modern European iconography as well as of Armenian medieval manuscripts mostly from Matenadaran, we expect to find more about the sources of these extraordinary Constantinople artists.

In the terms of interdisciplinarity of this study, such as previous studies of our team [33], the first on-site technical examination was performed. The closer look by microscope allowed us to detect some color changes in the paint layers, possibly caused by pigment degradation, which will be studied in future work using *in situ* spectroscopic techniques. This

will allow us to understand better the techniques of Constantinople artists and their traditional or innovative approaches.

As part of the doctoral project "Between Tradition and Innovation: An Interdisciplinary Approach in the Study of Seventeenth-Century Armenian Manuscripts", other Armenian manuscripts will be studied. This will include, the three Armenian Gospel manuscripts preserved at the Gulbenkian Museum in Lisbon.

3.1.7. References

- [1] Silva, N. V. (1999). A Home for Our "Friends of a Lifetime, Only the Best Masterpieces of the Calouste Gulbenkian Museum, Lisbon. K. Baetjer, J. D. Draper (eds.), The Metropolitan Museum of Art, New York, p. 11-18.
- [2] Gulbenkian Archives (Fundação Calouste Gulbenkian, Arquivos Gulbenkian), Lisbon, doc. no. MCG 04428, dossier of Sirarpie Der Nersessian, 1968.
- [3] Kouymjian, A., Kouymjian, D. (1974). The Museum Calouste Built, Saudi Aramco World, 9/10, p. 6-11.
- [4] Ribeiro, M. Q. (1999). Only the Best: Masterpieces of the Calouste Gulbenkian Museum, Lisbon. K. Baetjer, J. D. Draper (eds.), The Metropolitan Museum of Art, New York, p. 21-22, no. 4.
- [5] Nersessian, V. (2001). Treasures from the Ark: 1700 Years of Armenian Christian Art. The British Library, London, p. 188-89, no. 117.
- [6] Baghdiantz McCabe, I. (1994-95). Silk and Silver: The Trade and Organization of New Julfa at the End of the Seventeenth Century. *Revue des Études Arméniennes*, 25, p. 389-416.
- [7] Baghdiantz McCabe, I. (1998-2000). An Armenian King in Exile: New Julfa's Shah through a Persian Edict and an Armenian Bible. *Revue des Études Arméniennes*, 27, p. 321-328.
- [8] Baghdiantz McCabe, I. (2010). The Armenian Bible of 1623 and the Merchant Communities of Constantinople and New Julfa. In: *Armenian Constantinople*, S. Payaslian, R. G. Hovhannisian (eds.), Costa Mesa, p. 183-199.
- [9] Baghdiantz McCabe, I. (2018). Connections Between Constantinople and New Julfa, In: *Armenia: Art, Religion, and Trade in the Middle Ages*. H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 232-233.
- [10] Merian, S. L. (2018). Armenian *Scriptoria* in Constantinople. In: *Armenia: Art, Religion, and Trade in the Middle Ages*. H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 235, 238-240, no. 109.
- [11] Rodrigues, J. (2019). The Rise of Islamic Art, 1869-1939. J. Hallett (ed.), Calouste Gulbenkian Foundation, Lisbon, p. 117-118.
- [12] Arakelyan, M. (2011). Sixteenth and Seventeenth Century Armenian Illuminated Manuscripts from Galicia, Podillia and Bukovyna. In: *Armenian-Ukrainian Historical Contacts. Papers of the International Conference Held in Lviv*, K. Bardakjian, F. Sysyn, A. Yasinovskyi (eds.), Lviv, p. 93-112.
- [13] Panossian, R. (2006). *From Kings and Priests to Merchants and Commissars*. Hurst & Company, London, p. 87-91.
- [14] Der Nersessian, S. (1977). *L'Art Arménien*. Arts et Metiers Graphiques, Paris, p. 223-24, 233-237.

- [15] Der Nersessian, S. (1986). *Armenian Miniatures from Isfahan*. Les Editeurs d'Art Associés, Armenian Catholicosate of Cilicia, Brussels, p. 131, 163, 175.
- [16] Kouymjian, D. (2011). *Armenian Medieval Illumination*. In: *Armenia: Imprints of a Civilization*. G. Uluhogian, B. L. Zekiyanyan, V. Karapetian (eds.), Skira, Milan, p. 97.
- [17] Merian, S. L. (2014). *Illuminating the Apocalypse in Seventeenth-Century Armenian Manuscripts: The Transition from Printed Book to Manuscript*. In: *The Armenian Apocalyptic Tradition: A Comparative Perspective*, K. B. Bardakjian, S. La Porta (eds.), Brill, Leiden-Boston, p. 603-640.
- [18] Kouymjian, D. (2012). *Notes on Armenian Codicology. Part 1. Statistics Based on Surveys of Armenian Manuscripts*. In: *Comparative Oriental Manuscript Studies*, 4, July, p. 18-24.
- [19] Adjemian, Sh. (1992). *Ts'uts'ak Astuats'ashunch' mateani hayeren dzeragirnerun* [Grand Catalogue of Armenian Bible Manuscripts], Lisbon.
- [20] Merian, S. L. (2015). *Illuminated Manuscripts: The Collection in Context*. In: *Armenia: Masterpieces from an Enduring Culture*. Th. M. van Lint, R. Meyer (eds.), Bodleian Library, University of Oxford, p. 56-57.
- [21] Kouymjian, D. (2006). *Armenian Bookbinding: From Manuscript to Printed Book (Sixteenth to Nineteenth Century)*. *Gazette du Livre Médiéval*, 49, automne, p. 1-14.
- [22] Akinian, N. (1947). *Step'anos Dzik' Jughayec'i: gric' nkaric' ev tałasac' k'ahanay (1603-1637)* [Step'anos Dzik' Jughayec'i: Scribe, Painter and Poet Priest (1603-1637)]. *Handes Amsorya*, 2, p. 112-124.
- [23] Ghazaryan, V. (1995). *Xoranneri meknut'yunner* [Commentaries on Khorans], Yerevan.
- [24] Bogharian, N. (1967). *Mayr ts'uts'ak dzeragrats' Srbots' Hakobeants'* [Grand Catalogue of St. James Manuscripts]. Vol. II, Jerusalem.
- [25] Avetikean, G., Syurmelean, Kh., Avgerean, M. (1836). *Nor barğirk' haykazean lezvi* [New Dictionary of the Armenian Language]. Venice.
- [26] Ghazaryan, R., Avetisyan, H. (2009). *Mijin hayereni bararan* [Dictionary of the Middle Armenian], Yerevan.
- [27] Bogharian, N. (1972). *Mayr ts'uts'ak dzeragrats' Srbots' Hakobeants'* [Grand Catalogue of St. James Manuscripts]. Vol. VI, Jerusalem, p. 461-469.
- [28] Taylor, A. (1995). *Book of Arts of Isfahan: Diversity and Identity in Seventeenth-Century Persia*. The J. Paul Getty Museum, Los Angeles, p. 62.
- [29] Der Nersessian, S. (1966). *Erznkayi 1269 t'vi Astvac'ashunch'ë. Erusalem tiv 1925* [The Bible of Erznka from 1269: Jerusalem no. 1925]. *Ejmiats'in*, 11-12, p. 27-40.

- [30] Sargsyan, L. (2019). Hin Ktakarani nkarazardumě ZHD dari hayeren mi Astvats'ashnch'um (Avag manrankarch'i arvestě) [The Old Testament Illumination in a Fourteenth Century Armenian Bible (The Art of Miniaturist Avag)]. *Banber Matenadarani*, 28, p. 296–332.
- [31] Yeganyan, O., Zeytunyan, A., Antabyan, P., Keoshkeryan, A., Ter-Vardanyan, G. (1984, 2004, 2013). *Mayr ts'uts'ak hayeren dzeragrats Mashtots'i anvan Matenadarani* [Grand Catalogue of Armenian Manuscripts of the Mashtots Matenadaran]. Vols. I, II, VIII, Yerevan.
- [32] Hamburger, J. F. (2002). *St. John the Devine: The Deified Evangelist in Medieval Art and Theology*. University of California Press, London, p. 21–43, 95–165.
- [33] Melo, M. J., Castro, R., Miranda, A. (2014). Color in Medieval Portuguese Manuscripts: Between Beauty and Meaning. In: *Science and Art: The Painted Surface*, A. Sgamellotti, B. G. Brunetti, C. Miliani (eds.), Royal Society of Chemistry, London, p. 170–192.

This is a forthcoming manuscript:

*Three Exquisite Gospel Books from the Last Centuries of Armenian Scriptoria, in the Collection of the
Gulbenkian Museum*

3.2. Three Exquisite Gospel Books from the Last Centuries of Armenian *Scriptoria*, in the Collection of the Gulbenkian Museum

3.2.1. Introduction

In the permanent exhibition of the Calouste Gulbenkian Museum, in Lisbon, four Armenian manuscripts are displayed as part of the collection. This small but important group of manuscripts is being studied for the first time in detail, in the framework of a doctoral project⁷ that aims to examine these handwritten and illuminated codices by textual, visual, and material analysis.

The Armenian manuscripts of the Gulbenkian collection, a Bible (LA 152), and three Gospel Books (LA 193, LA 216, LA 253) are exquisite examples of the last Armenian *scriptoria* of the seventeenth-century Armenian communities of Constantinople, New Julfa (Isfahan) and Crimea. Thus, they illustrate a peculiar map of entangled connections of these three communities both at local and global levels, by disclosing their cultural, social, and political realities, far from the Armenian homeland.

Our first reflection on this Gulbenkian codices was the study of the Bible LA 152 by art historical approach [1] that emerged far more perspectives to be explored in detail in the art of this unique manuscript, preferably in a larger comparative context. In this paper, we introduce our first communication on art, history, and codicology of three Armenian Gospel Books of the Gulbenkian collection.

3.2.2. History of the Manuscripts

Like many artworks of the Gulbenkian collection, three Armenian Gospel Books (LA 193, LA 216, LA 253) were acquired by Gulbenkian himself through different intermediaries [2]. Thus, LA 193 was purchased in 1926, in London, from a vendor named Kehyaian & Co, a company apparently dealing with the importation of antique oriental carpets and other commodities. LA 216 was purchased in 1935, in Paris, from a vendor of old books named Giraud-Badin. The provenance and acquisition history of LA 253 is unknown. After being housed at Gulbenkian residencies in Paris and London, the manuscripts found their terminus in Lisbon and since then are the part of the permanent exhibition of the Gulbenkian Museum.

Three Gospels were described for the first time by renowned art historian Sirarpie Der-Nersessian, at the very beginning of the newly established Gulbenkian Museum [3]. Furtherly,

⁷ “Between Tradition and Innovation: An Interdisciplinary Approach in the Study of Seventeenth-Century Armenian Manuscripts”, Ph.D. grant [PD/BD/142866/2018] awarded by the Portuguese Science Foundation (FCT-MCTES).

the manuscripts were mentioned in several scholarly works [4-6]. However, unlike the Bible LA 152, the Gospels LA 193, LA 216, and LA 253 did not receive much attention.

3.2.3. Colophons and Annotations

Trajectories of LA 192, LA 216, and LA 253, from their place of origin up to westernmost Europe, are uncertain. With this, they share a common destiny with numerous Armenian manuscripts, dispersed in the collections worldwide. However, the further exploration of preserved colophons and annotations helped us to reconstruct the narratives for LA 192 and LA 216, while that of LA 253 remains obscure due to the lack of colophon. Complete transcribed colophons in their original language can be found in [7].

LA 193 possesses a short colophon, from which we learn about the author of the manuscript, named Nikoṭayos. There are no dates and places mentioned. Our comparative observations within a large number of Armenian manuscripts confirmed that LA 193 is a work of the famous scribe and artist Nikoṭayos⁸, known also as Nikoṭos, Nikoṭayos Melanavor, or Caṭkarar. His name is related to the seventeenth-century Armenian *scriptoria* of Crimea, where he was active as a scribe and artist during 1647-1693, in the monastery of St. Sargis in Kaffa [8]. Therefore, this Gospel is attributed to the hand of Nikoṭayos.

LA 216 possesses a larger colophon enabling us to retrieve more details. The manuscript was copied in the Armenian *scriptoria* of New Julfa (Isfahan), through the participation of scribe Gaspar and artist Hayrapet. Apparently, scribe Gaspar or Gaspar erc' was one of the productive scribes of New Julfa. Several Armenian colophons mention his name in collaboration with several artists of his time (Matenadaran MSS 7614, 204, 191), and with Hayrapet among them (Matenadaran MSS 2399, 189) [9]. Hayrapet was one of the well-known artists of New Julfan *scriptoria*. In several colophons, his name appears also as Hayrapet Jowṭayec'i, varpet (master) Hayrapet, or Herapet. He seems to dispose of almost 52 fruitful years (1639-1691) of work as an illuminator for numerous manuscripts [10]. Some examples of his art are the Gospels Matenadaran MSS 2399, 7224, and Bibles Matenadaran MSS 2587, 201. Hayrapet used to leave his name under the illustrations, as can be observed also in LA 216. Together with the names of the scribe and artist, the colophon of LA 216 mentions the name of Etsabert', a woman who commissioned this Gospel. We also learn that this act of commissioning was to be served as good remembrance for Etsabert' herself and her parents.

In the case of LA 253, as mentioned before, there is no preserved colophon. It possesses only one later annotation from 1820 at the beginning of the codex, with the names of Ôvanes and Nigar xat'own, likely the later owners of the manuscript. The Gospel is probably incomplete. In the last folio, the text and the bird-shaped drawings outlined with red ink

⁸ Mentioned also in the notes of Sirarpie Der Nersessian.

remained unfinished. There are several missing pages and some loose gatherings in the binding. However, based on pictorial style, LA 253 was attributed to the seventeenth-century Armenian *scriptoria* of Constantinople⁹. We do not exclude the participation of the New Julfan *scriptoria* either.

3.2.4. Codicology

The brief codicological description of LA 192, LA 216, and LA 253 is given below. In the manuscripts, the beginning and the end of each gathering are indicated with an Armenian letter of certain alphanumerical value (Table 4), which is reported in the same way in the description below. The Arabic numerals next to each letter indicate the number of folios included in each gathering. When the indicative letter for the gathering is missing, we replace it with an Arabic numeral. The Latin equivalents of Armenian letters can be found in the transliteration system (Table 4) provided at the end of this paper.

Gospel LA 193

SIZE: 176x133. FOLIOS: 277+2 (posterior pagination in pencil: 1-554, references in this description are to the posterior pagination, therefore, the recto and verso of each folio are not indicated), unwritten: 1-3, 6-7, 10-11, 14-15, 18-19, 22-27, 175, 548-549, 551, probably missing between 228-229. GATHERINGS: 1x13 + A-IGx12 (T', IGx7, T'x10). SCRIPTURE: *bolorgir* (round minuscule), one column, 23 lines. MATERIAL: parchment, inks and pigments, gold. BINDING: brown leather on wooden boards, silver plaques overlaid on the outer faces of the left and right boards, remnants of two fabric straps attached to the outer face of the right board, lining of protective parchment attached to the boards. ENDLEAVES: 1 (left) + 1 (right), parchment, unwritten. CONDITION: good.

ILLUMINATIONS: ornated letters, narrative miniatures in almost all the folios, Canon Tables (4-5, 8-9, 12-13, 16-17, 20-21), ornated title-pages (29, 177, 273, 429), Evangelists: Matthew (28), Mark (176), Luke (272), John (428).

DATE: 17th century (1647-1693). PROVENANCE: Crimea. SCRIBE: Nikoṭayos. ILLUMINATOR: Nikoṭayos. PATRON: unknown.

Gospel LA 216

SIZE: 108x079. FOLIOS: 266, unwritten: 2v-3r, 4v-5r, 6v-7r, 8v-9r, 10v-11r, 139r-141r, 213r, 264v-265r, 266r-266v. GATHERINGS: 1x10 + A-IAx12 (Zx14, Ax8) + 1x6. SCRIPTURE: *bolorgir* (round minuscule), two columns, 25 lines. MATERIAL: parchment, inks and pigments, gold. BINDING: brown leather on wooden boards, double silver cover, fore-edge

⁹ Mentioned also in the notes of Sirarpie Der Nersessian.

flap with two silver straps on the right board, lining of stamped fabric. ENDLEAVES: probably missing. CONDITION: good.

ILLUMINATIONS: ornated letters and marginalia, narrative images in almost all the folios, Canon Tables: (1v-2r, 3v-4r, 5v-6r, 7v-8r, 9v-10r), ornated title-pages (12r, 92r, 142r, 214r), Evangelists: Matthew (11v), Mark (91v), Luke (141v), John (213v), Genealogy of Christ in 39 roundels (12v-15v), Tree of Jesse (16v).

DATE: 1686. PROVENANCE: New Julfa. SCRIBE: Gaspar. ILLUMINATOR: Hayrapet. PATRON: Etsabert'.

Gospel LA 253

SIZE: 154x114. FOLIOS: 280, unwritten: 1r-1v, 2v-5r, 6v-7r, 8v, 9v-10r, 11v-12r, 13v-14r, 15r, 16v-17r, 18v-19r, 20v-21r, 22v-23r, 24v-25r, 26v-28r, 94r, 143r, 278r-280v; probably missing between: 8v-9r, 14v-15r, 17v-18r, 36v-37r, 38v-39r, 82v-83r; protective paper leaves added later between 5v-6r (double leaves) and between 7v-8r, 8v-9r, 10v-11r, 12v-13r, 15v-16r, 25v-26r, 28v-29r, 94v-95r, 143v-144r, 219v-220r (single leaf). GATHERINGS: 3 (4+13+9) + A-IAx12 (Bx8, Θx10) + IB (5+13). SCRIPTURE: *bolorigir* (round minuscule), two columns, 23 lines. MATERIAL: parchment, inks and pigments, gold. BINDING: brown stamped leather on wooden boards, fore-edge flap on the right board, lining of striped fabric. ENDLEAVES: probably missing. CONDITION: good.

ILLUMINATIONS: ornated letters and marginalia, full-page narrative miniatures (5v-6r, 7v-8r, 9r, 10v-11r, 12v-13r, 14v, 15v-16r, 17v), Canon Tables (18r, 19v-20r, 21v-22r, 23v-24r, 25v-26r), ornated title-pages (29r, 95r, 144r, 220r), Evangelists: Matthew (28v), Mark (94v), Luke (143v), John (219v), unfinished bird-shape outlines in red and unfinished text (277v), blank folios lined in red (278r-279r).

DATE: 17th century (?). PROVENANCE: Constantinople (?). SCRIBE, ILLUMINATOR, PATRON: unknown.



Figure 17. Bindings of the three Gospels. From left to right: LA 193 (Crimea, 17th century); LA 253 (Constantinople, 17th century (?)); LA 216 (New Julfa, 1686). © Gulbenkian Museum

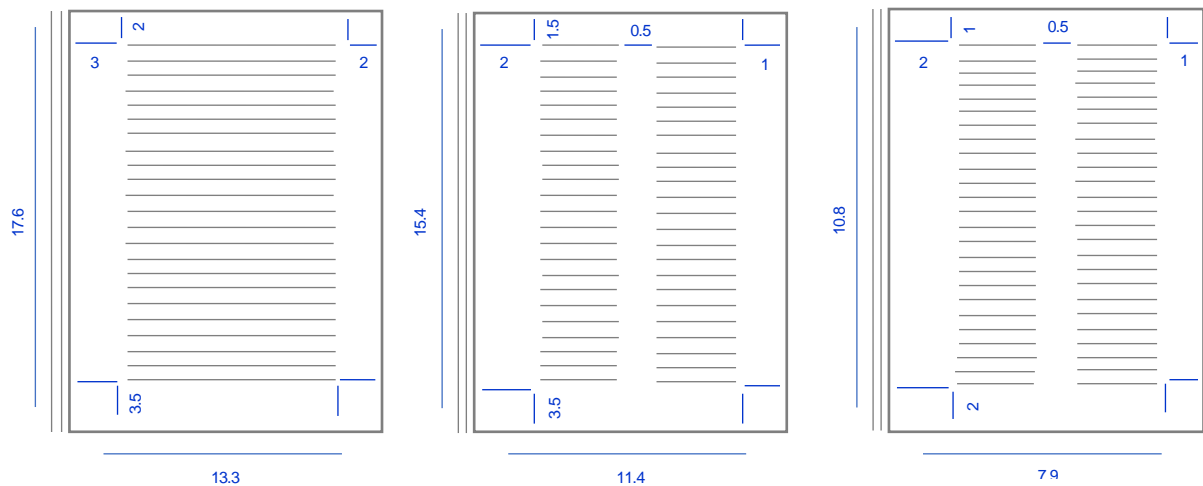


Figure 18. Page layout for each manuscript (all numbers are given in centimeters). From left to right: LA 193 (Crimea, 17th century); LA 253 (Constantinople, 17th century (?)); LA 216 (New Julfa, 1686).

3.2.5. Art of the Illuminations

Gospel LA 193

LA 193 is one of the beautiful manuscripts of the Gulbenkian collection. The pictorial program of this Gospel is reflected in the arrangement of illuminations, typical of Armenian manuscript art. At the beginning of the Gospel, there are fully illuminated folios of ten Canon Tables, including the Eusebian Letter. All the Canons are lavishly illuminated with floral and animal patterns of vivid colors. Portraits of Eusebius and Carpianus are depicted in the upper arches of the first two Canons. The subsequent eight Canons are embellished with a variety of trees, vegetal ornaments, birds, and animals such as peacocks, roosters, partridges, lions, and monkeys. Each of these elements has a specific meaning and place in the context of Canon Tables, described already in several medieval texts by Armenian Church fathers and scholars of the time [11].

Each Gospel Book opens with a portrait of an Evangelist and a fully illuminated title-page, distributed in two separate folios facing each other. Evangelists Matthew, Mark, and Luke are represented in inclined writing position, John is dictating the words to young Prokhoron. Title-pages have elaborated headpieces, marginalia, and text written in ornated and majuscule bird-letters, with the symbol of each Evangelist at the beginning. The Genealogy of Christ is represented in 78 roundels (pp. 292-295), in the Gospel of Luke. Other illuminations, such as marginal ornaments and elaborated initial letters are more than familiar to Armenian manuscript art. Vegetal patterns and palmettes in marginalia indicate the text chapters that usually start with beautiful majuscule letters composed of interlaced ornaments and birds.

The originality of this manuscript is the frieze-like narrative miniatures, composed of tiny forms and figures and merged in the text of almost every folio. In this way, the content of the Gospels emerges visually in front of the reader. This peculiar feature appears in an earlier Armenian Gospel known as the “Gospel of eight artists” (Matenadaran MS 7651, 13-14th centuries, Sis, Cilicia), produced in the Armenian Kingdom of Cilicia (1198-1375). MS 7651, in its turn, is known to be copied from a Byzantine example (Laurenziana MS Plut.6.23, 1001-1100), and its miniature style was already considered a novel approach in medieval Armenian *scriptoria*. Hence, LA 193 comes to attest to the artist Nikotayos’s admiration towards the miniature art of Cilician Armenia. Moreover, LA 193 is not the only copied example of MS 7651 by Nikotayos. He executed three copies of this famous Gospel [10], one of them being the manuscript Matenadaran MS 6341 (1684, Kaffa), almost identical to LA 193. Evidently, medieval Armenian manuscripts were highly appreciated and widely copied in the early modern Armenian *scriptoria*¹⁰. This fact indicates the inheritance and continuity of artistic traditions up to very late periods of Armenian manuscript illumination.



Figure 19. The Massacre of the Innocents (Matthew 2:16-18). Left: LA 193, p. 36 (Crimea, 17th century), © Gulbenkian Museum; Right: MM 7651 (Sis, Cilicia, 13-14th centuries), © Matenadaran.

10 There are even exact indications of that. For instance, the colophon of an Armenian Gospel from 1669-70 (Freer MS 36.15) clearly mentions that the Canon Tables are copied from an earlier example (Walters MS 539) that seems to be illustrated in 1262 by famous artist T'oros Roslin (see Der Nersessian, Armenian Gospel illustration as seen in manuscripts in American collections, in: Byzantine and Armenian studies, 1973, p. 523; Der Nersessian, Armenian manuscripts in the Freer Gallery of Art, 1963, p. 94).



Figure 20. Detail. Top: LA 193, p. 61 (Crimea, 17th century), © Gulbenkain Museum; Bottom: Laurenziana Plut.6.23, f. 15v (Byzantium, 1001-1100), © Biblioteca Medicea Laurenziana

Gospel LA 216

LA 216 is the next exquisite manuscript of the Gulbenkian collection. The particularity of this manuscript is in its small dimensions that emphasize the mastery of the artist to render impressively elaborated miniatures in such tiny scales. Apart from that, this codex bears a precious silver cover of delicate craftsmanship. The art of this manuscript reflects the style of seventeenth-century New Julfan *scriptoria* and testifies to the continuation of painting traditions established by renowned artist Hakob Ǿowtayec'i. Hayrapet, the artist of LA 216, seems to continue the workmanship of his masters, yet in his unique way.

The arrangement of Canon Tables and Evangelist portraits with their respective title-pages in LA 216 is similar to that of LA 193. Ten Canon Tables, including the Eusebian Letter, are eye-catching compositions of interlaced forms and colors. The inspiration and expertise of the artist result in a kind of fusion of traditional Cilician and New Julfan styles. The hand of Hayrapet renders robust forms. Heavily decorated headpieces and massive columns of Canons are filled with intertwined vegetal patterns, birds, and animals. The Cilician inspiration of Hayrapet is observable especially in headpieces of Canons when compared, for instance, with such manuscripts as Topkapi MS 122, (ff. 7v-8r, 1v-2r, 3v-4r), Matenadaran MS 7644 (f. 5v), Matenadaran MS 2629 (f. 3v), Venice MS 1635 (f. 8r)¹¹.

¹¹ See reproductions in: Der Nersessian, *Byzantine and Armenian Studies*, 1973, Vol. II, p. 87-88, figs. 318-323 for Topkapi MS 122, and p. 93, fig. 342 for Matenadaran MS 7644 (f. 5v); in: Der Nersessian, *Manuscripts Arméniens illustrés*, Album, 1937, Pl. XVIII for Venice MS 1635 (f. 8r); and in: *Miniature Painting in the Armenian Kingdom of Cilicia*, 1993, p. 157-59 for Matenadaran MS 2629 (f. 3v); personal consultation in Matenadaran.



Figure 21. Canon Tables. Left: Matenadaran MS 7644, f. 5v (13th century, Cilicia), © Matenadaran; Right: LA 216, f. 5r, (1686, New Julfa), © Gulbenkain Museum.

Four Evangelists in LA 216 are portrayed in writing position, accompanied by their symbols. The frames of the portraits are elaborated, resembling the style of Hakob Ğowtayec'i, and the backgrounds are lavishly embellished with gold. The name of Hayrapet ("Hayrapet catkoť") appears on the bottom of the portrait frames. The title-pages of each Gospel are composed of ornated headpieces, marginal palmettes, text incipits composed of majuscule bird-letters, and considerably large initial letters formed by Evangelist symbols. The headpiece of Evangelist Matthew's title-page assembles the figures of Christ, the Virgin, and John the Baptist in three upper semi-arches. At the beginning of the Gospel of Matthew, there are seven consecutive folios representing the Genealogy of Christ in 39 roundels, followed by the full-page miniature of the Tree of Jesse.

Narrative biblical scenes are within the text as small rectangular-shaped images related to the context. Ornated initial letters are at the beginning of most of the chapters. A nice detail implemented by Hayrapet is that the text of each Gospel Book is embellished with zoomorphic or anthropomorphic majuscule letters representing the symbol of each Evangelist. Hence, all the initial letters in the Gospel of Matthew are composed merely of angels; letters composed of lions, oxen, and birds are present in the Gospels of Mark, Luke, and John respectively. This manuscript is unique for its vivid illuminations of a variety of flowers in almost every marginalia. The colorful feast of carnations, irises, tulips, and lilies gives a striking and delightful impression to the reader. Above discussed stylistic details somehow are a novel approach developed by Hayrapet, resulting from his long-lasting artistic experience.

Nevertheless, one may notice the stylistic consistency of the artist when compared, for instance, LA 216 with Matenadaran MS 2399, an earlier example of Hayrapet's collaboration with scribe Gaspar. Although 30 years separate two Gospel manuscripts, LA 216 (1686) and MS 2399 (1656), the mastery of Hayrapet remains almost the same.



Figure 22. Details in marginalia. LA 216 (New Julfa, 1686). © Gulbenkian Museum

Gospel LA 253

There is no colophon preserved in Gospel LA 253, thus it is not known when, where and by whom this manuscript was copied or who was the commissioner. Sirarpie Der Nersessian in her first observations attributed this manuscript to Constantinopolitan *scriptoria* [3]. We would also suggest the possible participation of New Julfan *scriptoria*, based on stylistic parallels. Indeed, the pictorial style of this Gospel represents characteristics typical to a group of Armenian Gospels produced during the seventeenth century, between Constantinople and New Julfa.

Unlike LA 193 and LA 216, this Gospel begins with the so-called Christ cycle, typical to the tradition of Armenian Gospel illumination [12-13]. This cycle consists of full-page alternate miniatures representing the life of Christ, usually from Annunciation to Resurrection, and precedes the Canon Tables. The number and theme of images may vary in each Gospel. The Christ cycle of LA 253 includes the Annunciation, Nativity, Presentation at the Temple, Baptism, Raising of Lazarus, Entry into Jerusalem, Washing the Feet, Betrayal, Crucifixion, Descent from the Cross, Ascension, and Second Coming. This group of miniatures is followed by nine illuminated folios of Canon Tables, including the Eusebian

Letter. Unfortunately, the first folio of the Eusebian Letter is missing, and the group of Canons starts by continued letter, with the figure of Carpianus in the headpiece. After Canons, the four Gospel Books begin in the usual order, with respective full-page portraits of Evangelists and title-pages. The text itself does not possess illuminations, apart from marginal ornaments and rubricated incipits adorned with bird-letters.

Both full-page miniatures and ornaments in this manuscript render a skillful artistic hand and deeply resemble the style of medieval Armenian illumination. In general, LA 253 gives the impression of an earlier-than-seventeenth-century manuscript. In our attempts to precisely date this Gospel and to reveal any possible hint related to its history, we did extensive comparative studies among the number of Armenian manuscripts. Our observations were mostly referenced to the group of miniatures representing the Christ cycle and the Evangelist portraits.

An intrincating detail of this Gospel is the execution of the Evangelist portraits in their very classical forms, resembling many Byzantine examples. This mastery of an unknown artist may mislead one at first glance, by attributing LA 253 to the medieval period. Our quest revealed very similar examples to Evangelist portraits of LA 253, present in several Armenian manuscripts. LA 253 portraits are almost identical to those of Matenadaran MS 2629 (1272-78, Gospel, Sis/Cilicia). More examples, stylistically comparable to portraits of LA 253 can be observed within the Armenian Gospels Jerusalem MS 2568 (13th c., Prince Vasak's Gospel, Cilicia), Beirut MS (1297, Cilicia), British MS Or. 5626 (1282, Cilicia), Matenadaran MS 6290 (1295, Cilicia), Jerusalem MS 2563 (1272, Cilicia)¹². As one can notice, all those manuscripts are Gospels from the thirteenth-century *scriptoria* of the Armenian Kingdom of Cilicia. This fact, again, comes to attest to the revival and continuity of medieval artistic traditions, widely adopted by the early modern Armenian miniaturists.

Additionally, in our quest for dating and finding the authorship for LA 253, we approached two seventeenth-century Armenian manuscripts that contain almost the exact copies of the abovementioned Evangelist portraits: Matenadaran MS 248, (1656, Gospel, New Julfa)¹³ and Matenadaran MS 204 (1660, Bible, New Julfa)¹⁴ Both manuscripts are produced in New Julfa. The Gospel MS 248, as LA 253, does not possess a colophon. However, the script of MS 248 is somehow resembling that of LA 253, and each verse or chapter in the text starts

¹² Some reproductions and more details on mentioned Gospels can be found in the literature. For Matenadaran MS 2629 see General Catalogue of Armenian Manuscripts of the Maštoc' Matenadaran, 2013, Vol. 8, p. 810-812; Armenia: Art, Religion and, Trade in the Middle Ages, The Metropolitan Museum of Art, 2018, p. 156; Der Nersessian, Miniature Painting in the Armenian Kingdom of Cilicia, 1933, Vol. II, illustration n. 418 - f.13v (Matthew), f. 92v (Mark), f. 139v (Luke), f. 221v (John and Prochoros). Ibidem: illustrations for: Jerusalem MS 2568 (n. 413 - f.94v, Mark); Beirut MS (n. 532 - f.15v, Matthew, n. 533 - f.104v, Mark, n. 534 - f.163v, Luke, n. 535 - f.257v, John and Prochoros); British MS Or. 5626 (n. 518 - f.101v, Mark); Matenadaran MS 6290 (n. 525 - f.14v, Matthew, f.103v, Mark, f.162v, Luke, f.261v, John and Prochoros); Jerusalem MS 2563 (n. 398 - fol.115v, Mark).

¹³ See more in: General Catalogue of Armenian Manuscripts of the Maštoc' Matenadaran, 1984; Gevorgyan, Ananown hay manrankaric'ner [Anonymous Armenian miniature painters], 2005, p. 464; personal consultation in Matenadaran.

¹⁴ See more in: General Catalogue of Armenian Manuscripts of the Maštoc' Matenadaran; Gevorgyan, Hay manrankaric'ner [Armenian miniature painters], 1998, p. 714; personal consultation in Matenadaran.

with alternating blue and red majuscule letters, as in LA 253. MS 204 is a Bible copied by scribe Gaspar, most probably the same Gaspar as for the Gulbenkian Gospel LA 216, and there is a name, probably for the artist, that is written in cryptogram and can be decrypted as Step'anos.



Figure 23. Portrait of Evangelist Matthew. Left: LA 253, f. 28v (Constantinople, 17th century (?)), © Gulbenkian Museum; Right: Matenadaran MS 2629, f. 13v (Cilicia, 13th century), © Matenadaran.

Apart from Evangelist portraits, the full-page narrative illuminations of LA 253 found their stylistic parallels within the other seventeenth-century Armenian manuscripts, such as Jerusalem MS 1887 (1643, Gospel, Sanahin), Paris MS Smith-Lesouëf 252 (1654, Gospel, Isfahan), Morgan MS M.623 (17th century, Gospel, Isfahan), Morgan MS M.621, (17th century, Gospel, Constantinople). In Paris MS Smith-Lesouëf 252, the sequence of narrative illuminations is incorrect probably due to posterior restoration and rebinding of the manuscript, the portraits of Evangelists are missing, but the style of the artist is closer to that of LA 253. In Morgan MS M.623 and MS M.621, on the contrary, the portraits of Evangelists follow the style of the narrative illuminations and do not repeat the approach of LA 253, yet, resembling the artistic hand of LA 253.

These comparisons reaffirm that LA 253 pertains to a group of Armenian Gospels produced within the seventeenth century either in New Julfa or in Constantinople. However, the scribe's or artist's identity for LA 253 remains unknown, leaving a lacuna for several hypotheses. Was it the intention of the producers of this manuscript to remain unknown? Was the manuscript, as the last folios demonstrate, left unfinished and without a conclusive colophon? Were any names lost together with some missing folios from this Gospel? At this point, we assume that more investigation and larger comparative studies may help to trace back the original narrative of this beautiful Gospel Book.



Figure 24. The Baptism. From left to right: LA 253, f. 8r (Constantinople, 17th century (?)), © Gulbenkian Museum; Morgan MS M.621, f. 6r (Constantinople, 1650); Morgan MS M.623, f. 4r (New Julfa, 1658-59), © Morgan Library.

3.2.6. Conclusions

The comparative study of three Armenian Gospels (LA 193, LA 216, LA 253) of the Gulbenkian collection demonstrates that each of these manuscripts is a unique testimony of Armenian art, produced in the seventeenth-century diaspora communities of Constantinople, New Julfa, and Crimea. The continued tradition of handwritten and illuminated codices in the given period indicates the societal demand and potential for the execution of such objects. Two of the Gospels, LA 193 and LA 216 are works of the well-known masters of that time - Nikołayos Melanavor the artist and scribe active in Crimea (LA 193), and Hayrapet the artist with Gaspar the scribe active in New Julfa (LA 216). Regarding Gospel LA 253, which does not possess any colophon, we confirmed the initial assumption of its attribution to the Constantinopolitan school. For this manuscript, we tentatively suggest the possible participation of the New Julfan school as well. We hope that further comparative studies based on iconography and codicological features of LA 253 will allow us to identify the producers of this Gospel.

The art of the three Gospel manuscripts reflects the tendencies appreciated in the scriptorial practices of three communities, demonstrating the preference for medieval models by seventeenth-century Armenian artists. This is a clear indication of the continuity of local traditions in manuscript art during the period when new Western inspirations found their expression in many Armenian manuscripts, mostly Bibles. This dedication and faithfulness to local, predominantly medieval traditions were confirmed not only by iconography but also

by material analysis of these Gulbenkian Gospels, confirming the use of color palettes of certain pigments that were copiously used in medieval Armenian illumination [14].

Table 4. The capital letters of the Armenian alphabet with corresponding transliteration and alphanumerical value.

Armenian	Ա	Բ	Գ	Դ	Ե	Զ	Է	Ը	Թ
Transliteration	A	B	G	D	E	Z	È	Ə	T'
Alphanumerical value	1	2	3	4	5	6	7	8	9
Armenian	Ճ	Ի	Լ	Խ	Շ	Կ	Հ	Ջ	Ղ
Transliteration	Ž	I	L	X	C	K	H	J	Ł
Alphanumerical value	10	20	30	40	50	60	70	80	90
Armenian	Տ	Ս	Յ	Ն	Շ	Ո	Չ	Պ	Ջ
Transliteration	Č	M	Y	N	Š	O	Č'	P	J'
Alphanumerical value	100	200	300	400	500	600	700	800	900
Armenian	Ռ	Ս	Վ	Տ	Ր	Թ	Փ	Ք	Ք
Transliteration	Ř	S	V	T	R	C'	W	P'	K'
Alphanumerical value	1000	2000	3000	4000	5000	6000	7000	8000	9000

3.2.7. References

- [1] Grigoryan, H.; Melo, M. J.; Miranda, A.; Rodrigues, J. (2020). The Gulbenkian Bible (17th c.): an interdisciplinary study of a precious Armenian heritage. In: Art of the Armenian Diaspora (World Art Studies), W. Deluga (ed.), Polish Institute of World Art Studies & Tako Publishing House, Warsaw-Toru , Vol. 20, p. 59-75.
- [2] Gulbenkian Archives (Fundação Calouste Gulbenkian, Arquivos Gulbenkian), Lisbon, doc. no. MCG 01470, MCG 02085, personal consultation, October 2019.
- [3] Gulbenkian Archives (Fundação Calouste Gulbenkian, Arquivos Gulbenkian), Lisbon, doc. no. MCG 04428, dossier of Sirarpie Der-Nersessian, personal consultation, October 2019.
- [4] Kouymjian, A., Kouymjian, D. (1974). The Museum Calouste Built. Saudi Aramco World, 9/10, p. 6-11 (p. 7).
- [5] Der-Nersessian, S. (1977). L'Art Arménien. Paris, p. 233-236.
- [6] Arakelyan, M. (2011). Sixteenth and Seventeenth Century Armenian Illuminated Manuscripts from Galicia, Podillia and Bukovyna. In: Armenian-Ukrainian Historical Contacts. Papers of the International Conference Held in Lviv, K. Bardakjian, F. Sysyn, A. Yasinovskyi (eds.), Lviv, p. 93-112 (p. 103).
- [7] Grigoryan, H. (2022). C'owc'ak Lisaboni Kiwlpênkean t'angarani hayerên jeřagreri [Catalogue of the Armenian manuscripts from the Gulbenkian Museum of Lisbon]. Banber Matenadarani, 34, p. 350-376.

- [8] Gevorgyan, A. (1998). Hay manrankari 'ner, matenagitowt'iwn, IX-XIX dd. [Armenian miniature painters, Bibliography, IX-XIX centuries]. Cairo, p. 594-608.
- [9] Mayr C'owc'ak hayeren jeřagrac' Mařtoc'i anvwan Matenadarani [General Catalogue of Armenian Manuscripts of Mařtoc' Matenadaran] (1984). Vol. 1, Matenadaran, Erewan.
- [10] Gevorgyan, A. (1998). Hay manrankari 'ner, matenagitowt'iwn, IX-XIX dd. [Armenian miniature painters, Bibliography, IX-XIX centuries]. Cairo, p. 328-339.
- [11] Łazaryan, V. (1995). Xoranneri meknowt'yownner [Commentaries on Canon Tables]. Erewan.
- [12] Mat'ewosyan, K., Avetisyan, A. (1993). Avetaranakan patkerner: Terownakan řark'i 12 glxavor patkernerə [Gospel Illustrations: The 12 main illustrations of the series of Lord]. Erewan.
- [13] Kouymjian, D. (2015). Some iconographical questions about the Christ Cycle in Armenian manuscripts and early printed books. In: *Le sacre Scrittura e loro interpretazioni, Orientalia Ambrosiana*, 4, p. 121-143.
- [14] Grigoryan, H., Vieira, M., Nabais, P., Araújo, R., Melo, M. J., Manso, M.; Miranda, A. M., Rodrigues, J. (2023). Exceptional illuminated manuscripts at the Gulbenkian Museum: a Bible and three Gospels produced in the Armenian diaspora. *Heritage*, forthcoming.



CHAPTER 4

Detail, bird-ornament, LA 193, p. 8

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Dyes in History and Archaeology (37/40):*

*Grigoryan, H., Sahakyan, A., Melo, M. J. (2023). Vordan Karmir: An Attempt to Unravel the
Mystery of Armenian Cochineal Recipes for Paints and Inks Used in Manuscripts. In: Dyes in History
and Archaeology, J. Kirby (ed.), Archetype Publications, London, Vol. 37/40, p. 190-201.*

4. ART TECHNOLOGY

In this chapter, we present the part of this dissertation that is related to art technological study of artistic materials, including experimental reconstructions of ancient formulations. The first part of the chapter presents our first attempts at understanding Armenian cochineal recipes, their formulations and functionality, as well as the ingredients and preparation processes. The second part is already a more established continuity of our initial study, based on historical recipe reconstructions, which is a work in progress and will be completed by molecular analysis of reproduced paints, and reference data creation.

4.1. *Vordan Karmir*: An Attempt to Unravel the Mystery of Armenian Cochineal Recipes for Paints and Inks Used in Manuscripts

Abstract

Vivid reds and purples in 17th-century Armenian manuscript illuminations led us to the search for lost Armenian cochineal recipes. Our study focused on Armenian cochineal (*Porphyrophora hamelii*) and its historical use as a dye and pigment, to better understand the ancient technology employed and its evolution through the centuries. Our research enabled us to locate new cochineal recipes, which were described in the 17th- to 19th-century Armenian texts preserved in the Matenadaran collection at Yerevan. To the best of our knowledge, these recipes contain details about the use of ingredients and the extraction processes, which differ from those described in other European texts for the preparation of paints and inks based on this type of insect. By gathering local ingredients, including Armenian cochineal, the writing inks and paints were reproduced with as much historical accuracy as possible. This knowledge will be further applied to study the formulations of cochineal paints and writing inks in illuminated manuscripts.

4.1.1. Introduction

The history of cochineal is as enigmatic and broad as the variety of red to purple shades which are obtained from this scale insect. The use of this minute insect refers to both the Old and New Worlds, spanning from the ancient to early modern eras and between Orient and Occident. Before the Spanish expansion into the Americas in the 16th century, which brought to light the Mexican cochineal (*Dactylopius coccus* Costa, 1829), the Old World cochineal species such as Armenian (*Porphyrophora hamelii* Brandt, 1833) and Polish (*Porphyrophora polonica* (Linnaeus, 1758)) cochineal, together with kermes (*Kermes vermilio* Planchon, 1864) and lac (*Kerria lacca* (Kerr, 1782)) insects were in use by artisans and artists [1]. The laborious manufacture of these species resulted in costly and luxurious products, highly appreciated by privileged social classes. Once considered one of the precious natural dyes, cochineal has never lost its value.

Organic reds and purples are among the most common colors used in Armenian illuminated manuscripts. From an art technological perspective, little is known about Armenian cochineal used in scriptorial practices, although it was identified and characterized by using analytical chemistry in some instances [2]. Given the possibility of studying a group of illuminated codices of the last workshops of the Armenian diaspora (17th-century Constantinople, New-Julfa, and Crimea) [3], we decided to focus our investigation on cochineal-based reds and purples, often mentioned in Armenian historical sources but not yet examined scientifically. The objective of this study is to better understand the ancient technology used to process Armenian cochineal and its progress throughout the centuries. We aim to give a scientific explanation to theoretical statements and to prepare the ground for further comparisons. Our methodology combines several disciplines consisting of archival, field, and experimental work.

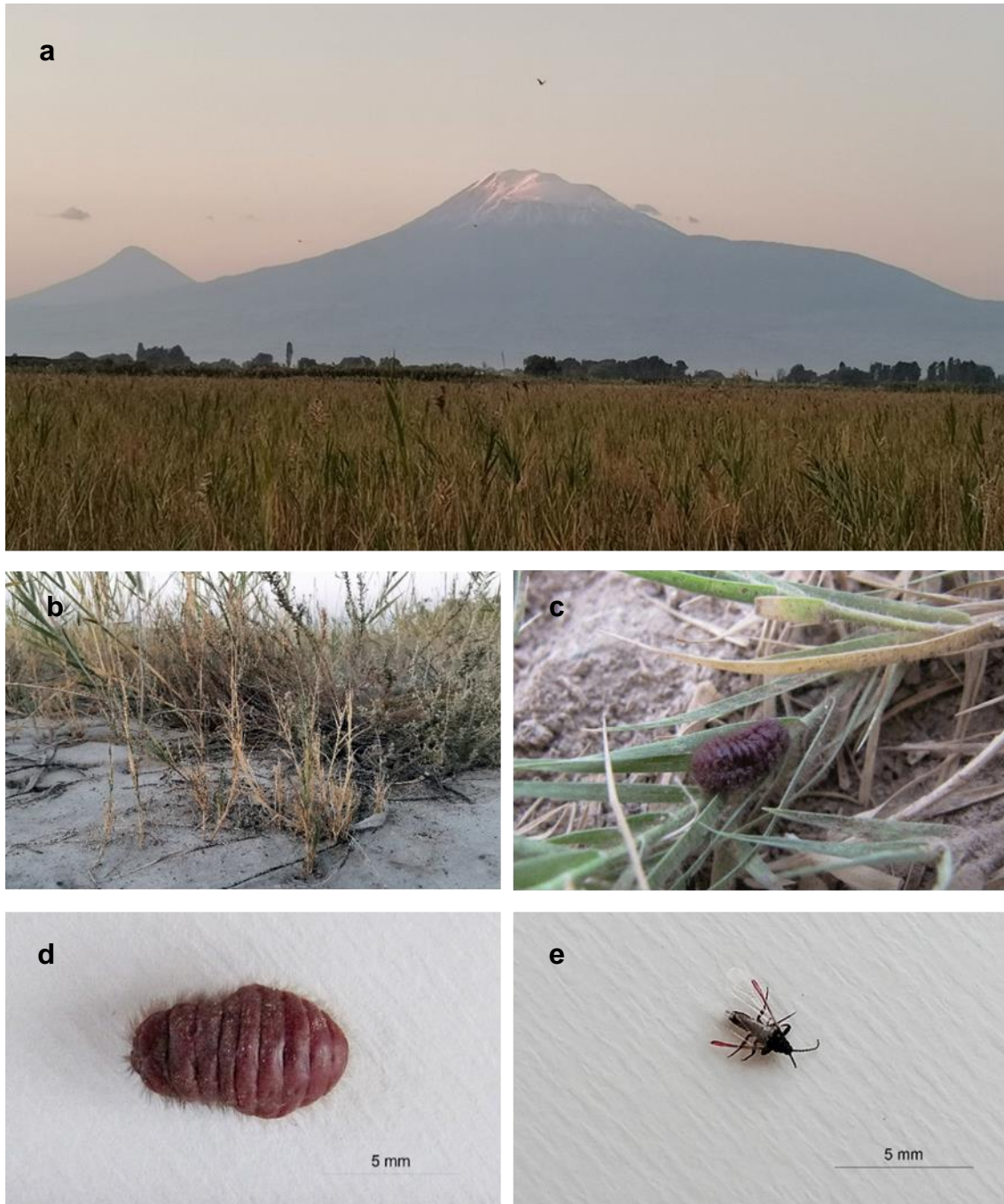


Figure 25. (a) The field at the foot of Mount Ararat in the early morning; (b) *Aeluropus littoralis*, the hostplant of Armenian cochineal; (c) the emerging cochineal; (d) *Porphyrophora hamelii*, Armenian cochineal, female and (e) male. (Photos: Hermine Grigoryan, Universidade NOVA de Lisboa)

4.1.2. Armenian Cochineal: Nomenclature

Porphyrophora hamelii Brandt is the scientific designation of Armenian cochineal, suggested in 1833 by the German naturalist Johann Friedrich von Brandt and attributed to Josef Hamel, a Russian physician of German descent, who made the first report on Armenian cochineal [4]. In the Armenian language, cochineal is known by the name *vordan karmir* (որդան կարմիր), which literally means ‘the worm’s red’ (*vord* = worm, *karmir* = red), and *vordan* can be widely applied to an insect or worm, red color or dyestuff. In historical-comparative linguistics, the etymology of *karmir* is explained by an ancient root *kirm* (Pahlavi) or *kṛmi* (Sanskrit), meaning the ‘worm’. This worm-to-red transition is suggested to derive from ancient knowledge of obtaining a purplish-red color from a kind of worm. The same pattern is present in other languages, where the worm and its red are named as *karmir* (Sogdian), *karmil* (Hebrew), *kókkinos* (Greek), *kırmızı* (Turkish), *kirmiz* (Arabic), *alquermes* (Spanish), *kermès* (French), *carmesino* (Italian), *carmim* (Portuguese), *Karmesin* (German), *kiermes* (Polish) and *karmazin* (Russian). In vernacular middle Armenian, *xrmzi* and *tərməzi* variations were common [5]. These linguistic attributions are surprisingly similar and reflect the path of ancient understanding back to a single point when certain scale insects were perceived as bearers of a red-coloring substance.

4.1.3. Biology and Habitat

Porphyrophora hamelii is a scale insect of the genus *Porphyrophora* in the family Margarodidae. The females of this species are up to 12 mm long and 6 mm wide, oval-shaped, flat, without wings, with six small legs, small eyes and antennae, and dark red coloration, resembling a worm (Figure 25). Males are considerably smaller with a black body, transparent and purple-edged wings, big eyes, long legs, and a long, filiform tail resembling a fly. A major part of the life cycle of these insects has a stationary nature. They grow attached to the roots of the host plant throughout the year. In August–September, both females, and males emerge from the ground to seek a mate. This period lasts about six weeks, but only one day for each insect. Afterward, the males die, while the females bury themselves in the ground and snuggle up to the roots of the host plant or nearby, preparing the waxy pockets to receive the laid eggs. Later, the females also die. In April–May, the newborn larvae leave the egg pockets and move towards the plant roots, if they are not already there. They feed on the roots and rhizomes of the host plant until they become mature in the next year [6].



Figure 26. Map of present-day Armenia showing the sites of *P. hamelii* (marked in red) visited by our team. (Map source © d-maps.com)

The dye component, and almost 30% of the lipids (dry weight), are in the female insect body. Histological analysis performed in the early 1970s established the presence of the dye in the tissues of Armenian cochineal during all stages of its maturation, including in the eggs. Apparently, egg-swollen females were collected from *K. vermilio* and *D. coccus*, probably to obtain a higher dye yield [7]. It might have also been the case with *P. hamelii*, but there are no records to confirm this. However, since the females hide themselves in the ground immediately after mating, they would be more difficult to find.

P. hamelii is endemic to a geographical area that includes the Ararat Valley, between Anatolia, the Armenian Highlands, and the Iranian Plateau (Figure 26). Its usual habitat is in the saline soils along the river Araks (Araxes) and the areas at the foot of Mount Ararat. In Armenia, generally, the surroundings from Xor-Virap to Sardarapat are considered to be cochineal-fertile areas: semi-desert vegetation areas are habitats of Armenian cochineal. Common hostplants are coastal light-loving *Aeluropus littoralis* (Gouan) Parl. (see Figure 25) and common water-loving *Phragmites australis* (Cav.) Trin. ex Steud., named in Armenian sources as *sēz* (grass), *vordnaxot* (worm's grass), or *eteg* (reed).

4.1.4. Carminic Acid as the Main Dye in Armenian Cochineal

Carminic acid is the main coloring agent present in the female body of Armenian cochineal (Figure 26), identified in the Color Index as Natural Red 4, C.I. 75470. In the past, to be used to dye textiles or prepared as a lake pigment, it would have been necessary to complex the water-soluble molecule of carminic acid with a metal ion, such as the aluminum ion, Al³⁺. The final structures for the pigments are complex and have yet to be determined, but there are several favorable positions for binding Al³⁺. The carboxylic acid at C7 solo or combined with the OH at C6; one of the carbonyls at C9/C10 combined with one of the OH groups at C1 /C4; by the catechols at C3 and C4 (Figure 27). All these oxygens may be involved in the final complex structure of the lake pigments. In addition, carminic acid is able to establish acid–base equilibria in solution with consequent color changes from deep reds to purples; therefore, a variety of color shades may be obtained by varying the pH. Together with carminic acid, other minor compounds such as flavokermesic acid, kermesic acid, and some unidentified groups are present in cochineal dye that may act as markers between different insect species [9].

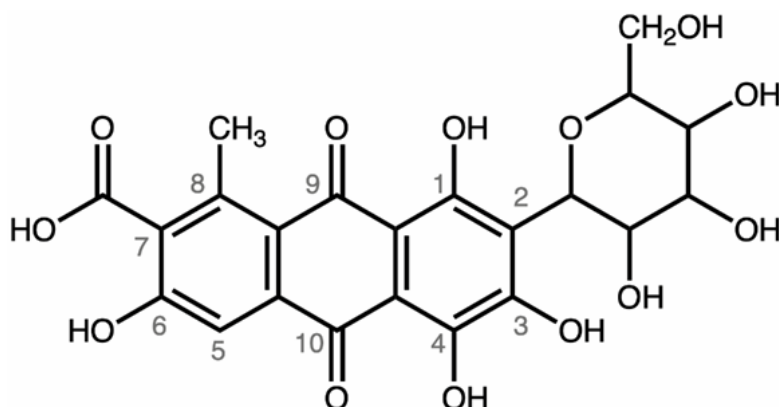


Figure 27. Molecular structure of carminic acid, the main dye in Armenian cochineal. IUPAC name, 7-(β -D-glucopyranosyl)-3,5,6,8-tetrahydroxy-1-methyl-9,10-dioxo-9,10-dihydroanthracene-2-carboxylic acid.

4.1.5. History

Since ancient times, Armenian cochineal has been used as a natural dyestuff. One of the earliest known reports is related to the name of Assyrian ruler Sargon II who, after invading the ancient Kingdom of Urartu in 714 BC, had pillaged valuable red woollens that were believed to be dyed with cochineal [10]. Armenian historians Movses Xorenac'i and tazar P'arpec'i (5th century AD) describe *vordan* in the fields of Ararat. P'arpec'i writes: 'De même la gracieuse plaine d'Ararat produit ... des cochenilles pour la fabrication des couleurs vermeilles qui donnent du profit et du luxe aux gens intéressés.' [11]

In medieval Armenia, cochineal seems to have been used mainly as a dyestuff for fine fabrics manufactured in the cities of Artasat and Dvin. Numerous medieval Arab chronicles (8th to 10th centuries) mention the famous dye workshops in *Dabil* (Dvin) and *Kariat-al-Kirmiz* [the city of red] (Artasat), together with precious ‘Armenian dye-tinged’ fabrics [12]. Armenian cochineal appears in the late medieval travelers’ notes of Ruy Gonzalez de Clavijo and John Chardin [13]. From the 16th century onwards, Armenian cochineal was gradually replaced by the American species. Historical fluctuations, the loss of statehood, and the continuously reshaping frontiers of Armenia reduced the priority of its cochineal.

Vordan was largely forgotten until the 19th century when Eastern Armenian provinces were annexed to the Russian Empire, and interest grew in the propagation sites of Armenian cochineal and its potential as a dye source. An important contribution was made by Isahak Ter-Grigoryan, known as Sahak Catkarar (*catkarar* = illuminator or miniature painter), who was diligently trying to reveal the lost traditional uses of cochineal [14]. Field missions and collaborations with the Imperial Academy of St Petersburg fostered a new stimulus encouraging cochineal observations. It appeared in the field of academic interest, up to being appreciated by the Russian Czar [15]. Some significant results, such as the scientific report by Hamel, were presented and published in the German and Russian languages [16], binding his name to the Latin designation of Armenian cochineal (*hamelii*). Another report by Chopin on Erevan khanate, a province under Russian rule by the 19th century, gives some insights into cochineal distribution. He writes: ‘In some places, it propagates in the quantities that the land seems a carpet with red ornaments. The animals grazing here seem to have red-colored legs, from having trampled the cochineal’ [17].

Between the 1930s and 1970s, attempts were made to recover cochineal production in Soviet Armenia, but it remained at limited levels. In 1987, the natural state reserve Vordan Karmir was established to ensure the protection and sustainable use of the saline ecosystems of the Ararat Valley, and its flora and fauna. However, in the following decades, the existence of the insect was endangered due to the human factor: agricultural interventions and animal pasture in these areas have dramatically reduced the cochineal population. Nowadays, around 220 hectares of state reserve are protected areas of *P. hamelii* – formerly an area of 11,000 hectares – and the insect is included in the Red Book of endangered species of the Republic of Armenia.

4.1.6. Preparing Paints from Armenian Cochineal

This study was organized through a three-pronged methodology of (a) archival, (b) field, and (c) experimental work:

- a) Consultation of written sources and retrieval of Armenian cochineal recipes;
- b) Observation and collection of Armenian cochineal in its habitat;
- c) Reconstructions and rationalization of the recipes.

Technical Written Sources

In the quest for Armenian cochineal recipes, our first step was to collect and translate published recipes.¹⁸ Then, Armenian manuscripts kept at Matenadaran, dating from the 17th to the 19th century, which contain texts on natural medicine, arts, chemistry, and other topics, were consulted. In this miscellaneous content, it was possible to trace several new recipes that share common characteristics with those already reported.

The collected recipes share a common structure in terms of ingredients and preparation methods (Table 5). Recurring ingredients include *tərməz*, *č'otan*, *lot'ur* and *šib*, from which *tərməz* and *šib* are identified as cochineal and alum respectively, while the authentication of *č'otan* and *lot'ur* is discussed below. The common feature of these recipes is the extraction of *č'otan*, to which the cochineal or its extract is admixed, followed by the addition of *lot'ur* and alum. In one case, an additive *č'at'var*, identified as zedoary (*Curcuma zedoaria* (Christm.) Roscoe), is mentioned. In some instances, advice is given to mixing the pigment with gum before using it. As we did not find this type of processing in other cochineal-based colorants described in the technical literature we have rationalized these recipes and the function of the different ingredients used, starting with two of the main ingredients, *č'otan* and *lot'ur*.

Table 5. New recipes of Armenian cochineal and an example of one of the recipes.

N	MS	Date	Ingredients						Preparation
			<i>vord</i> or <i>tərməz</i> (cochineal)	<i>č'otan</i> (soapwort)	<i>jur</i> (water)	<i>lot'r</i> or <i>lurt'r</i> (lodhra)	<i>šip</i> (alum)	other	
1	3189	1627-31	+	+	+	+	+	<i>samt</i> (gum)	boil, filter, dry
2	7322	1694	+	+	+	+	+		boil, filter, dry
3	10853	1786-88	+	+	+	+			boil, filter, dry
4	3000	18 th c.	+	+	+	+		<i>č'at'var</i> (zedoary)	boil, filter
5	7715	18 th c.	+	+	+	+	+		boil, filter, dry
6	10978	18 th c.	+	+	+	+	+		boil, filter, dry
7	11128	18 th c.	+	+	+	+	+	<i>samt</i> (gum)	boil, filter, dry
8	10645	1807	+	+	+	+	+		boil, filter, dry
9	7280	1812	+	+	+	+	+		boil, filter, dry
10	4194	19 th c.	+	+	+	+		<i>metr</i> (honey)	boil, filter, dry

Ձեռ. 3189, թ. 25ա, ժողովածու, 1627-1631	MS 3189, f. 25r, Miscellanea, 1627-1631
<p>Խրատ վասն որթան Եախ առ որթ, չողան, լուրթըր, շիպ, ամենն սըղբէ, չողանն մի սըղբէր, որիշ-որիշ սղբէ գատ ի չողանն, ապա յորժամ ջուրն ածես ծանիր որ 2 [6] դրամ որթանն Ա [1] նուկի ջուր ած: Յառաջն ջուրն դիր պուտկով ի վերայ կրակին որ եռա, ապա մէկ դրամ որթանն մէկ պըտղունց չողան ձգէ, դիր որ եռայ, ապա վայր առ, ջուրն քամէ, դարձեալ դիր ի վերայ կրակին որ եռ մի գա ու որթն ձգէ խառնէ, քանի դրամ որթն է այնչափ պըտղունց լուրթըր ձգէ, այնչափ պըտղունց այլ շիպ ձգէ, խառնէ, ապա թէ լաւ դաւպանտով քամէ, ապիկի ամանով դիր որ չորնայ, բայց ի չորացնելն դոլպանտ շորով ծածկէ, որ չթօգոսի, յորժամ բանացնես սամղ ած ու գրէ, յայտ է:</p>	<p>Advice on cochineal First take cochineal, soapwort, lodhra, alum, grind all of it, do not grind the soapwort, grind the others despite soapwort, then when you pour the water, measure 1 nuki of water for 6 dram of cochineal. First put the water with crock on the heat to boil, then add 1 pinch of soapwort for [each] 1 dram of cochineal, put to boil, then take it off, strain the water, put again on the heat to boil once, and add the cochineal, mix. Add as many pinches of lodhra and alum as many are the drams of cochineal, mix. Then strain well with fine cotton cloth, put in a glass container to dry. But while drying, cover it with fine cotton cloth, that it will not get a dust. When you want to use, add gum, and write, that is it.</p>

Based on linguistic comparisons and previous interpretations, *č'otan* was identified as soapwort (*Saponaria officinalis* L.), a perennial plant native to Europe, Caucasus, and Asia. The name comes from the Latin *sapo* (soap), while *officinalis* stands for medicinal properties. Common names include *soapwort, fuller's herb* (English); *saponaire* (French); *saponaria comune, cindisi* (Italian); *erva-saboeira* (Portuguese); *jabonera, hierba lanaria, hierba de bataneros* (Spanish) [19]. Armenian names include *ōčaraxot* (օճառախոտ), *ōšnan* (օշնան), *ačari* (աճառի), *šmortak* (շմորտակ), *p'rp'rik* (փրփրիկ), *č'otan* (չողան) [20], of which *č'otan* was detected in our cochineal recipes. It is likely to be the *struthium* mentioned by Dioscorides, *struthos* by Theophrastus, *rootlet* and *radicula* by Pliny the Elder [21], all indicating the ancient use of this plant as a natural detergent. Medieval art treatises do not mention this plant or its use in cochineal paints and inks. The oldest mention of soapwort is probably found in the *Papyrus Graecus Holmiensis*, where some recipes indicate treatment with a soap plant prior to mordanting and dyeing wool, especially for a good purple or red [22]. Apparently, the traditional use of different soap plants is common in the cultures of the Americas. The saponin-containing local plants or tree fruits are used mainly for cleaning and degreasing the animal fibers before dyeing [23].

S. officinalis contains saponins in the roots, rhizomes, and leaves. The saponins found in *S. officinalis* are triterpenoid glycosides; these amphiphilic molecules have remarkable bioactive functions, acting as natural surfactants, antifungal, antibacterial, emulsifying, and foaming agents [24]. With respect to *lot'ur*, it was difficult to understand the exact relevance and attribution of this ingredient. In the end, it was proposed to be lodhra (*Symplocos racemosa* Roxb.), a non-local species most likely acquired through trade networks, as were many other oriental commodities. *S. racemosa* is an evergreen tree or shrub usually found in India and Indochina. Common names include *symplocos* or *lotur bark* (English), *lodha* (Hindi), *lodhra* (Sanskrit), *lotour* (French), *Lotbaum* (German), *lutr* (Arabic), *hyuseneak* and *lōt'uri* (հիլուտնեակ, լօթուրի, Armenian). Phytochemical studies of *S. racemosa* indicate the presence of many phenolic glycosides such as symplocoside, triterpenoids including betulinic acid, acetyloleanolic acid and oleanolic acid, and flavonoids such as quercetin [25]. Lodhra is

largely used in medicinal and Ayurvedic applications as well as in textile dyeing as a natural mordant and source of yellow dye due to its high aluminum ion, flavonoid, and tannin content [26]. We noticed some resemblances between the processes of cochineal-based textile dyes and our recipes, such as the preparation of two separate dye baths of cochineal and plants (usually containing aluminum and yielding a yellow color), and the subsequent mixture of these two. In some cases, alum was replaced by finely ground lodhra bark [27].

However, the authentication of *lot'ur* remains debatable and we do not dismiss the probability of it being another plant, such as *Lythrum salicaria* L. (*purple loosestrife* (English)), *arenacatik* (արենածաղիկ, Armenian) [28], or any other species. *L. salicaria* is a flowering plant native to Europe and Asia, which is known for its astringent properties and several chemical constituents, including tannin-related compounds, flavonoids, phenolic acids, and anthocyanins [29].

To summarise, both soapwort and lodhra are likely to be associated with textile dyeing as found in the practice of other cultures. The presence of these plants in cochineal-based colorants is quite unusual. How would they appear in the Armenian recipes of the early modern period? Could it be due to a practice 'contamination' passed from one workmanship to another? Is it a result of a newly emerged or an old practice? Is there any indirect relation with the extraction of dye from textile shearings, as in the case of Western European easel paintings? [30] These questions challenged us for further investigation. We looked for: (a) registered data on Armenian dyeing practices; (b) studies on ancient dye and pigment formulations in archaeological findings; and (c) possible hints in neighboring cultures, such as Iran and Turkey, where the propagation of *P. hamelii* also extends. This provided us with a comprehensive background [31], but overall we did not encounter the same pattern of cochineal recipes as presented in Table 5.

Field

In the search for *P. hamelii*, our team carried out two field assignments in Armenia (September 2020), with previously granted permission by the authorities, as the species is under the protection of the Ministry of Environment of Armenia. The areas visited are located in the regions of Armavir and Ararat, along the border between Armenia and Turkey. The observation was done in the early morning, roughly calculated as between 5.30 to 9.30 am, when the insects emerged from the roots of their host plant and remained on the ground for a couple of hours. After a long wait, we were fortunate to see the tiny red dots quivering between sandy soils and semi-dry plants. The very first appearance was registered at 6.46 am. As we were allowed to a small quantity of cochineal for study purposes, around 15 g of fresh insects were collected (see Figure 25).

The insects were then measured and photographed (Figure 25), gently sieved through a fine cotton cloth, washed by flotation in purified water, strained again through a fine cotton

cloth, and left to dry in the shade. We had to be watchful because after a while the washed and numbed insects started to move again. One part of the cochineal was kept in ethanol solution (20%) on the same day of collection, after being dried for an hour. Another part was dried in the shade for 2–3 days in a semi-closed cardboard container and kept in a hermetically closed flask.

Materials

The textual material used in this study consists of cochineal recipes retrieved from Armenian manuscripts preserved in the Matenadaran archive. Recipes and ingredients were analyzed comparatively through linguistic and art technological sources. An attempt at rationalization is given. The physical material for experiments includes the Armenian cochineal we collected during the fieldwork in Armenia, *S. officinalis* and *L. salicaria* purchased from a supplier of natural products, and *S. racemosa* and *C. zedoaria* kindly provided by our colleagues. The alum used was reagent grade potassium aluminium sulfate ($\text{AlK}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$). Gum arabic (grains) was purchased from Kremer Pigmente.

Preparing the Paints and Writing Inks

During this stage of the work, both exact and non-exact reconstructions of Armenian cochineal recipes were performed. The non-exact experimental part, using a few separated *P. hamelii*, was based on the main repeating profile of the recipes with small alterations. This approach was driven by our quest for a saturated purple or *cirani* (the color name attributed to ‘royal purple’ in Armenian texts), and a red ink suitable for writing.

Separated fresh cochineal (around 3.0 g) was ground in a mortar and boiled with water (150 mL) for 10 minutes. During the boiling process, the scum which formed was removed from the surface. Then, the extract was left to cool and filtered. The dry soapwort roots (3.0 g) were boiled in water (150 mL) for 10 minutes, left to cool, and filtered. The cochineal extract was divided into two parts: one was kept as a pure extract, while the other was mixed with an equal quantity of soapwort extract. Both were used as bases to which alum, lodhra, eggshell, and iron sulfate in powder form were added in minimal quantities (0.1–0.5 mg). The color alterations at the stage of the different additions were controlled visually. The colorants were left to precipitate in the shade for 2–3 days before collecting the dry pigments. To obtain paint samples on paper, the pigments were finely ground and used with and without a gum arabic solution. An experimental red ink was made based on one of the recipes (N4) with the addition of zedoary (Figure 28).



Figure 28. Experiments with *P. hamelii* and the obtained colorants (without binder) applied on paper.

The next step included the exact reconstructions or mock-ups of selected recipes (N4, N7, N10) using *D. coccus*, the Mexican cochineal species (Figure 29): as we needed to try several versions of the same recipe, the limited quantity of *P. hamelii* was kept for the best working recipe in the future. Our experimentation allowed us to better understand the general profile of these recipes as well as some details. It was assumed that the soapwort was probably employed in the recipes for its cleaning properties. In the case of fresh Armenian cochineal, even if the insects were previously washed, during the boiling process the minor impurities appeared in the form of greyish scum that was removed. Regarding the fatty nature of Armenian cochineal and the role of soapwort in the extraction of red dyes, this needs to be further explored. In the case of *lot'ur*, if we assume that it is lodhra, which has a high aluminum content, then why should it be used together with alum? Was it to regulate the dye precipitation or the color? We noticed that the use of only lodhra without alum works well in the recipe. If we assume that *lot'ur* is lythrum, then the intention of color adjustment can be suggested, as the latter produces different hues. Therefore, a wide variety of shades can be obtained by adjusting the quantity of lodhra or replacing it with lythrum. Finally, the 'whimsical character' of the Armenian cochineal should be considered when working with this minute insect as it is very sensitive to small changes which can result in perfect colors but not always.



Figure 29. Reconstructions with *D. coccus* and some of the obtained colorants applied on paper and parchment with and without binders.

4.1.7. Conclusion

Textual and practical study of Armenian cochineal recipes gives the first insights into their unique formulation. Some hypotheses on the emergence of these recipes may be suggested, such as the transition and adaptation of practical knowledge from one culture to another, or from the ancient to the early modern period at the local level; oral transmission, misleading or correct; or a secret hardly disclosed. To shed light on these hypotheses, the chronology and context of the recipes should be investigated thoroughly by exploring the earlier texts, folk stories and traditions, and practices of other cultures. However, the reconstructions of *Porphyrophora hamelii* recipes reveal many practical details and help to build a database of colorants to contribute to the preservation of Armenian illuminated manuscripts. Currently, the plant components mentioned in this study are being analyzed by spectroscopic and chromatographic techniques to better understand their chemical profile in cochineal formulations. We hope to include these data, together with molecular characterization of the colorants discussed in this paper and Armenian cochineal itself, in the future.

4.1.8. Notes and References

- [1] Donkin, R.A. (1977) 'The insect dyes of Western and West-Central Asia', *Anthropos, International Review of Ethnology and Linguistics* 72, pp. 847–80.
- [2] Keheyan, Y., Baraldi, P., Agostino, A., Fenoglio, G. and Aceto, M. (2016) 'Spectroscopic study of an Armenian manuscript from Biblioteca Universitaria di Bologna', *European Journal of Science and Theology* 12, 3, pp. 189–201; Keheyan, Y., Aceto, M., Calà, E., Gulmini, M. and Idone, A. (2018) 'Characterisation of colorants on a 15th century Armenian manuscript by means of different spectroscopic techniques', *e-Preservation Science* 15, pp. 1–8.
- [3] Armenian manuscripts housed at the Gulbenkian Museum in Lisbon are being studied in the framework of a doctoral project supported by the Portuguese Science Foundation (FCT).
- [4] Hamel, J. (1833) 'Über Cochenille am Ararat und über Wurzelcochenille im allgemeinen', *Mémoires de l'Académie Impériale des Sciences de St. Pétersbourg/Sciences mathématiques, physiques et naturelles*, III (1835), Frankfurt, pp. 9–64. Available at: <https://babel.hathitrust.org/cgi/pt?id=nyp.33433061520395&view=1up&seq=25&skin=2021> (accessed 21 August 2022).
- [5] Ačarean, H. (1926) *Hayeren Armatakan Bararan [Armenian Root Dictionary]*, Yerevan, pp. 558–9.
- [6] Mkrtchyan, L. (1976) 'Materialy po biologii razmnozhenija araratskoj koshenili (*Porphyrophora hamelii* Brandt)' [Materials on the reproduction biology of the Ararat cochineal (*Porphyrophora hamelii* Brandt)], *Biologicheskij zhurnal Armenii [Biological Journal of Armenia] (BJA)* 29, 8, pp. 44–52; Sarkisov, R., Zakaryan, V. and Gasparyan, G. (1985) 'Migracija lichinok Araratskoj koshenili k kormovym rastenijam' [Migration of Ararat cochineal larvae to forage plants], *Biologicheskij zhurnal Armenii (BJA)* 38, 8, pp. 714–17.
- [7] Mkrtchyan, L. (1973) 'K voprosu o lokalizacii krasnogo pigmenta v tele Araratskoj koshenili' [On the localization of the red pigment in the body of the Ararat cochineal], *Biologicheskij zhurnal Armenii (BJA)* 26, 8, pp. 75–8; Cardon, D. (2007) *Natural Dyes: Sources, Tradition, Technology and Science*, London, Archetype Publications, pp. 612, 621–2, 649.
- [8] Dapson, R.W. (2007) 'The history, chemistry and modes of action of carmine and related dyes', *Biotechnic and Histochemistry* 82, 4–5, pp. 173–87; Rosenberg, E. (2008) 'Characterisation of historical organic dyestuffs by liquid chromatography–mass spectrometry', *Analytical and Bioanalytical Chemistry* 391, pp. 33–57; Melo, M.J. (2009) 'History of natural dyes in the ancient

- Mediterranean world', in Th. Bechtold and R. Mussak (eds), *Handbook of Natural Colorants* (Wiley Series in Renewable Resource), Chichester, pp. 3–21.
- [9] Wouters, J. (1985) 'High performance liquid chromatography of anthraquinones: analysis of plant and insect extracts and dyed textiles', *Studies in Conservation* 30, pp. 119–28; Serrano, A. (2010) 'Cochineal, a precious source of red: cochineal dyes characterization by high performance liquid chromatography with diode array detection and principal component analysis' (Master's thesis, Department of Conservation and Restoration, University NOVA, Lisbon, Faculty of Science and Technology, <http://hdl.handle.net/10362/5786>), pp. 9–17; Serrano, A., van den Doel, A., van Bommel, M., Hallett, J., Joosten, I. and van den Berg, K.J. (2015) 'Investigation of crimson-dyed fibres for a new approach on the characterization of cochineal and kermes dyes in historical textiles', *Analytica Chimica Acta* 897, pp. 116–27.
- [10] Kurdian, H. (1941) 'Kirmiz', *Journal of the American Oriental Society* 61, 2, pp. 105–7; Donkin 1977 (see note 1 above), pp. 847–80.
- [11] P'arpec'i, Ł. (1869) *Collection des Historiens Anciens et Modernes de l'Arménie*, V. Langlois (transl.), 2 vols, Paris, vol. II, p. 263: 'Similarly the charming plain of Ararat produces ... cochineals for the production of brilliant red colors which give profit and luxury to interested people' (editor's translation); Xorenac'i, M. (1881) *Géographie de Moïse de Corène*, P. Arsène Soukry (transl.), Venice, pp. 34, 46.
- [12] Kurdian 1941 (see note 10 above).
- [13] Chardin, J. (1686) *The Travels of Sir John Chardin into Persia and the East-Indies; The First Volume, Containing the Author's Voyage from Paris to Ispahan*, London, p. 351; González de Clavijo, R. (1782) *Historia del Gran Tamorlan, Historia del gran Tamorlan e itinerario y enarracion del viage ...*, 2nd edn, Madrid, don Antonio de Sancha, p. 82 (first published Seville, 1582).
- [14] Sahak's experiments revealed ten killing and degreasing processes and three recipes using Armenian cochineal, described in his memoir (MS 6247, Matenadaran), written between 1800 and 1843 in the Monastery of Êjmiacin.
- [15] Galfayan, Kh. (1979) 'Araratyan vordan karmric' nerkanyut' stanalu Sahak Caŋkarari p'orjerə [The attempts of Sahak Caŋkarar to obtain a red colorant from Ararat cochineal], *Bnagitut'yan ev texnikayi patmut'yunə Hayastanum* [History of Natural Science and Technology in Armenia] 7, pp. 116–30.
- [16] Hamel 1833 (see note 4 above).
- [17] Translated from the Russian. Chopin J. (1852) *Istoricheskij pamjatnik sostojanija Armjanskoj-oblasti v jepohu ee prisoeinenija k Rossijskoj-Imperii* [Historical Monument of the State of the Armenian Region in the Era of its Accession to the Russian Empire], St Petersburg, p. 810.

- [18] Harutyunyan, A. (1941) Nerkeri ev t'anak'neri gorcacut'yunə hin haykakan jeṙagrurum [The Use of Paints and Inks in Ancient Armenian Manuscripts], Yerevan, pp. 54–5; Avdalbegyan, S. (1963–4) 'Sahak episkopos Ter-Grigoryani hišatakaranə' [The Memoir of Bishop Sahak Caṙkarar Ter-Grigoryan], Ėjmiacin 1963, 12, pp. 36–43; 1964, 1, pp. 32–9, 1964, 4, pp. 48–56; Galfayan, Kh. (1983) 'Poluchenie kraski karmin iz Araratskoj koshenili' [Obtaining carmine paint from the Ararat cochineal], Hudozhestvennoe nasledie [Artistic Heritage] 8, 38, pp. 75–87; Vardanyan, S. (2019) 'Araratyan vordan karmirə' [The Ararat vordan karmir] [Proceedings of the Congress in Memory of Academician Levon Xač'ikyan, Matenadaran, 28–30 June 2018], Yerevan, pp. 446–60.
- [19] EPPO Global Database (European and Mediterranean Plant Protection Organization). Available at: <https://gd.eppo.int/> (accessed 22 August 2022).
- [20] Alishan, Gh. (1895) Haybusak, Venice, pp. 655–6. Bedevian, A.K. (2006) Illustrated Polyglottic Dictionary of Plant Names, Cairo, p. 530 (1st edn 1936).
- [21] Theophrastus (1916) Theophrastus: Enquiry into Plants and Minor Works on Odours and Weather Signs, A. Hort (transl.), 2 vols, London, William Heinemann; New York, G.P. Putnam's Sons, vol. II (Books VI–IX), pp. 24–5, 52–3, 280–81 (Loeb Classical Library); Pliny [Gaius Plinius Secundus] (1952) Pliny: Natural History, H. Rackman (transl.), W.H.S. Jones and D.E. Eichholz, 10 vols, London, William Heinemann; New York, G.P. Putnam's Sons (repr. 1961), Vol. V, Book 19, chap. 18, para. 48, pp. 450–51; vol. VII, Book 24, chap. 58, para 96, pp. 70–71; Dioscorides, [Pedanius Dioscorides] (2000) Dioscorides: De materia medica, T.A. Osbaldeston (ed. and transl.) with R.P. Wood, Johannesburg, p. 323.
- [22] Caley, E.R. (transl.) (2008) The Leyden and Stockholm Papyri: Greco-Egyptian Chemical Documents from the Early 4th Century AD, edited by W.B. Jensen, Cincinnati, University of Cincinnati, pp. 68, 71–4, 77, 83 (Oesper Collections in the History of Chemistry); Konkol, K.L. and Rasmussen, S.C. (2015) 'An ancient cleanser: soap production and use in Antiquity', in S.C. Rasmussen (ed.), Chemical Technology in Antiquity (American Chemical Society Symposium Series, vol. 1211, chapter 9), Washington, DC, pp. 245–66.
- [23] Roquero, A. (2006) Tintes y tintoreros de América, Madrid, pp. 69–81.
- [24] Jia, Z., Koike, K. and Nikaido, T. (1998) 'Major triterpenoid saponins from *Saponaria officinalis*', Journal of Natural Products 61, pp. 1368–73; Oleszek, W. and Bialy, Z. (2006) 'Chromatographic determination of plant saponins: an update (2002–2005)', Journal of Chromatography A 1112, pp. 78–91; Augustin, J.M., Kuzina, V., Andersen, S.B. and Bak, S. (2011) 'Molecular activities, biosynthesis and evolution of triterpenoid saponins', Phytochemistry 72, 6, pp. 435–57; Moniuszko-Szajwaj, B., Masullo, M., Kowalczyk, M., Pecio, Ł.,

- Szumacher-Strabel, M., Cieślak, A., Piacente, S., Oleszek, W. and Stochmal, A. (2016) 'Highly polar triterpenoid saponins from the roots of *Saponaria officinalis* L.', *Helvetica Chimica Acta* 99, pp. 347–54.
- [25] Bedevian 2006 (see note 20 above), p. 573; Acharya, N., Acharya, S., Shah, U., Shah, R. and Hingorani, L. (2016) 'A comprehensive analysis on *Symplocos racemosa* Roxb.: traditional uses, botany, phytochemistry and pharmacological activities', *Journal of Ethnopharmacology* 181, pp. 236–51.
- [26] Singh, S.V. and Purohit, M.C. (2014) 'Evaluation of color fastness properties of natural dye extracted from *Symplocos racemosa* (Lodh) on wool fibres using combination of natural and synthetic mordants', *Indian Journal of Fibre & Textile Research* 39, pp. 97–101; Jung, M., Choi, J., Chae, H.-S., Cho, J.Y., Kim, Y.-D., Htwe, K.M., Lee, W.-S., Chin, Y.-W., Kim, J. and Yoon, K.D. (2015) 'Flavonoids from *Symplocos racemosa*', *Molecules* 20, pp. 358–65; Jain, H. and Vasantha, M. (2016) 'Eco friendly dyeing with natural dye – Areca nut; enhancing color fastness with natural mordants (myrobalan, lodhra and pomegranate) and increasing the antibacterial activity', *Archives of Applied Science Research* 8, 8, pp. 1–7.
- [27] Roquero 2006 (see note 23 above), p. 95; Cardon 2007 (see note 7 above), pp. 32–6, 218, 625; Rowe, A. Pollard, Miller, M.L. and Meisch, L.A. (2007) *Weaving and Dyeing in Highland Ecuador*, A. Pollard Rowe (ed.), Austin, University of Texas Press, pp. 274–6.
- [28] Mentioned by some authors in the 1970s, such as Avdalbegyan, S. (1974) 'Mi p'astat'ult' vordan karmir nerki masin' [A document on vordan karmir paint], *Biologicheskij zhurnal Armenii (BJA)* 27, 3, pp. 110–13; Babenko, V. (1979) 'Karmir vortan' [Vordan karmir], *Vokrug sveta [Around the World]* 10, pp. 38–41. Archived from the original on 11 October 2007. Available at: <https://www.vokrugsveta.ru/vs/article/5859/> (accessed 24 August 2022).
- [29] Rauha, J.-P., Wolfender, J.-L., Salminen, J.-P., Pihlaja, K., Hostettmann, K. and Vuorela, H. (2001) 'Characterization of the polyphenolic composition of purple loosestrife (*Lythrum salicaria*)', *Zeitschrift für Naturforschung* 56c, pp. 13–20; Piwowarski, J.P., Granica, S. and Kiss, A.K. (2015) 'Lythrum salicaria L. – underestimated medicinal plant from European traditional medicine: a review', *Journal of Ethnopharmacology* 170, pp. 226–50.
- [30] Kirby, J. and White, R. (1996) 'The identification of red lake pigment dyestuffs and a discussion of their use', *National Gallery Technical Bulletin* 17, pp. 56–80.
- [31] This background-building process prompted a larger comparative discussion that will be included in our final dissertation, together with transcribed and translated recipes.

This is a forthcoming manuscript:

*The Once Precious Vordan: Specificities, Reconstruction, and Chemical Characterization of
17th-19th Century Armenian Cochineal Recipes from the Collection of Matenadaran*

4.2 The Once Precious *Vordan*: Specificities, Reconstruction, and Chemical Characterization of 17th-19th Century Armenian Cochineal Recipes from the Collection of Matenadaran

Abstract

The historical recipes for paints used in illuminated manuscripts and based on Armenian cochineal were retrieved from technical written sources, transcribed, and translated. The recipes represent a distinct pattern in terms of ingredients and production process when compared with other cultural practices. The selected recipes were first reproduced with species of American cochineal (*D. coccus* Costa), due to the limited availability of the Armenian species (*P. hamelii* Brandt). After several repetitions, the best working recipe was triply reproduced with Armenian cochineal. The obtained pigments were applied with a binder on paper and parchment, the color coordinates were measured, and complementary chemical analyses were performed. Additionally, the plant ingredients, found exclusively in these Armenian recipes, were chemically analyzed and their attribution to cochineal formulations was elucidated.

4.2.1. Introduction

The red (*karmir*) and purple (*cirani*) dyes were highly praised in ancient and medieval Armenia. Used whether by dyers or artists, these exquisite colors were profoundly believed to be made of Armenian cochineal, an endemic scale insect for Ararat plain. Known as *vordan karmir* or *kirmiz* in the vernacular, cochineal is received and perceived in Armenian collective memory as a staple dye, used by the ancients.

Much has been written about the Armenian cochineal in historical sources [1-4] and contemporary scholarship [5-7]. Its biology and propagation were systematically explored in the recent past [8-10]. The dye composition of the Armenian species has been specified within the comparison of the other cochineal species [11-16]. Several studies report the exact or tentative identification of Armenian cochineal in historical artworks and archaeological findings [17-21]. Armenian cochineal has been investigated regarding new extraction methods of organic dyes [22]. It is worth mentioning some studies concerning Armenian cochineal recipes such as the attempts of recovering the ancient knowledge of cochineal paints [23-24], the brief recipe compilation [25], the analysis of Armenian cochineal and a reproduced paint [26]. However, the mystery of Armenian cochineal formulations is yet to be explored, which

is important not only for the exact identification of this specific dye in historical artworks but also for understanding its ancient technology, to be able to assess its preservation state and address the potential degradation issues.

The current journey towards the world of Armenian cochineal recipes was drawn by our interest in tracing this precious dye in Armenian manuscript illuminations, to reaffirm its use, or the contrary, as a painting material, and to evaluate the specificities of the cochineal recipes found in Armenian historical written sources. Organic reds in the Armenian manuscript illuminations, from the medieval to early modern period, are commonly attributed to *vordan karmir*. Although, its familiar species, the American cochineal has been the subject of numerous studies [27-28], Armenian recipes are yet to be the source of a thorough study, hindering their identification in manuscripts. In the framework of an interdisciplinary study, our team has explored the group of Armenian recipes and their ingredients, combining data from linguistics, history, botany, biology, chemistry, and conservation science.

We started our experiments with a single recipe [29-30], which grew our curiosity to look for more written evidence. After on-site consultation of several Armenian manuscripts in the Matenadaran Institute of Ancient Manuscripts, in Yerevan, we have selected ten recipes with indications on how to prepare the *vordan*, i.e. the pigment or ink from cochineal. We have found that these cochineal recipes have distinct ingredients and production methods, from their European counterparts. We tried to identify the recipe components as accurately as possible. This process was followed by a collection of local ingredients, including the Armenian cochineal (*P. hamelii*) (Figure 30), and preliminary experiments in Matenadaran [31]. Due to the limited quantity of Armenian species at our disposal, we opted to continue our experiments with American cochineal (*D. coccus*), the closest species to Armenian one in terms of the percentage of carminic acid, the main colorant, in the female body [11-16]. The next phases of recipe reconstructions were held in the Department of Conservation and Restoration at NOVA University of Lisbon. We decided to perform several experiments of the selected four recipes and to apply only the best working versions to the Armenian species. Additionally, some plant ingredients found exclusively in these Armenian recipes were chemically analyzed to fully understand their function in the cochineal formulations. Reproduced paints will be analyzed and characterized using spectroscopic and chromatographic techniques.



Figure 30. Armenian cochineal (*P. hamelii*) in the field. Left: Female cochineal in its hostplant (*Aeluropus litoralis*); Right: female and male cochineals. (Photos: Hermine Grigoryan, Universidade NOVA de Lisboa)

4.2.2. The Rationale of the Recipes

Ten Armenian cochineal recipes were retrieved from original sources that are manuscripts of different typologies, such as medicinal, chemical, and miscellanea compilations, ranging from the seventeenth to nineteenth centuries (Table 6). Our first trials of the selected recipes [31], performed mostly with *D. coccus* species, allowed us to better understand the rationale behind these technical texts and to establish a protocol based on a recurring pattern of ten recipe formulations (Appendix E). This pattern is unique in terms of ingredients when comparing the Armenian formulations with those found in European sources [32]. Apart from the basic ingredients of water, cochineal, and alum, there are two

Table 6. Armenian cochineal recipes retrieved from the original manuscripts preserved at the Matenadaran Institute of Ancient Manuscripts, Yerevan, Armenia.

N	MS	Date	Typology	Ingredients					
				<i>vordan / t'ərməz</i> (cochineal)	<i>č'ōlan</i> (soapwort)	<i>jur</i> (water)	<i>lot'ur</i> (lodhra)	<i>šip</i> (alum)	other
1	3189	1627-31	Miscellanea	+	+	+	+	+	<i>samt</i> (gum)
2	7322	1694	Book of Arts/Chemistry	+	+	+	+	+	
3	10853	1786-88	Miscellanea	+	+	+	+		
4	3000	18 th c.	Book of Arts/Chemistry	+	+	+	+		<i>č'at'var</i> (zedoary)
5	7715	18 th c.	Miscellanea	+	+	+	+	+	
6	10978	18 th c.	Book of Medicine	+	+	+	+	+	
7	11128	18 th c.	Miscellanea	+	+	+	+	+	<i>samt</i> (gum)
8	10645	1807	Book of Medicine	+	+	+	+	+	
9	7280	1812	Book of Medicine	+	+	+	+	+	
10	4194	19 th c.	Miscellanea	+	+	+	+		<i>mehr</i> (honey)

plant components present in all the recipes included in this study, the soapwort (*čōtan*, *Saponaria officinalis*) and lodhra (*lot'ur*, *Symplocos racemosa*).

Armenian practice extracts the cochineal in a previously prepared solution of soapwort rather than water. Soapwort is a plant mostly employed in dyeing practices as a natural detergent for wool and silk yarns and is hardly found in the preparations of cochineal paints [33-34]. The recipes do not suggest any clue about the use of soapwort, but they mention it steadily at the initial stage of the recipe preparation. What was the intention of extracting the cochineal in soapwort solution?

In further conclusive steps, the recipes usually end with an addition of lodhra, sometimes together with alum. Lodhra turns out to be a tree bark reach in AI [35-36], therefore its role in cochineal formulations is to facilitate the precipitation of the lake pigment. The recipes attribute the use of lodhra to color manipulations: “*If you want the brighter color, add more lotur*”. Were the practitioners of these recipes aware of the properties of lodhra and to which extent? And, if to consider the similar properties, why lodhra is sometimes used together with alum? At this point, we do not have exact answers to these questions which are challenging and require more investigation.

In one recipe (no. 4) there is a mention of zedoary (*j'at'var*, *Curcuma zedoaria*) but it is not specified when to add it and why. Zedoary is known also as white turmeric and is widely used in Ayurveda practice. The rhizomes of zedoary have wide beneficial properties for human health [37].

Unlike the soapwort, the zedoary, and especially the lodhra are not native plants or shrubs to Armenian geography (Figure 31). They are endemic species for India and Indochina, therefore should have been exported or exchanged in local communities. Did they arrive at the Armenian market from the remote lands through long-distance trading routes compassing the East and the West and administered by the Armenian merchants during the early modern period? Probably a deeper insight into travel and merchant accounts may help to shed light on this intriguing question. Regarding cochineal, its trade by Armenian merchants up to the nineteenth century can be traced in several accounts [38-39] that highlight the big quantities of *vordan karmir* sold in the markets of the Ottoman Empire and shipped across Europe.



Figure 31. Plant ingredients present in the Armenian cochineal recipes and their respective extracts: (a) soapwort (*Saponaria officinalis*); (b) lodhra (*Symplocos racemosa*); (c) zedoary (*Curcuma zedoaria*).

Regarding the preparation process, the recipes mostly suggest a two-step mechanism in which the first step includes the preparation of soapwort solution, while the second step includes the subsequent additions of cochineal, lodhra, and sometimes the alum (Appendix E). Either steps mention boiling or cooking for extractions in a pot or cauldron. Some utensils indicate the big quantities of preparations. An interesting and rather complicated image is found within the final filtration also due to unclear indications. The recipes suggest filtration and direct drying by evaporation, or decantation in several steps and further collection of the dried precipitate. Some even suggest collecting and keeping the decanted water probably to be used as the pigment of less intense color. Filtration is mostly advised by a thin cloth, while decantation by a sponge. One recipe (no. 4) does not mention the filtration, it is either missing or assumed to be so. Pigments are placed to be dried mostly on glass or porcelain containers. Some recipes suggest using the pigments with gum, and one with honey (no. 10). The transcribed and translated recipes, together with measure units and a glossary can be found in Appendix F.

4.2.3. Experimental

After the first stage of experimental reproductions, four recipes out of ten were selected for the next improved stage. Both stages were experimented with *D. coccus* species, due to the limited quantity of *P. hamelii* at our disposal that was left for the most reliable version. Recipes no. 1 (Ms. 3189, 17th century), no. 4 (Ms. 3000, 18th century), no. 7 (Ms. 11128, 18th century), and no. 10 (Ms. 4194, 19th century) were selected, in order to have the chronological shifts and slightly different ways of preparation. The reproduction was performed following

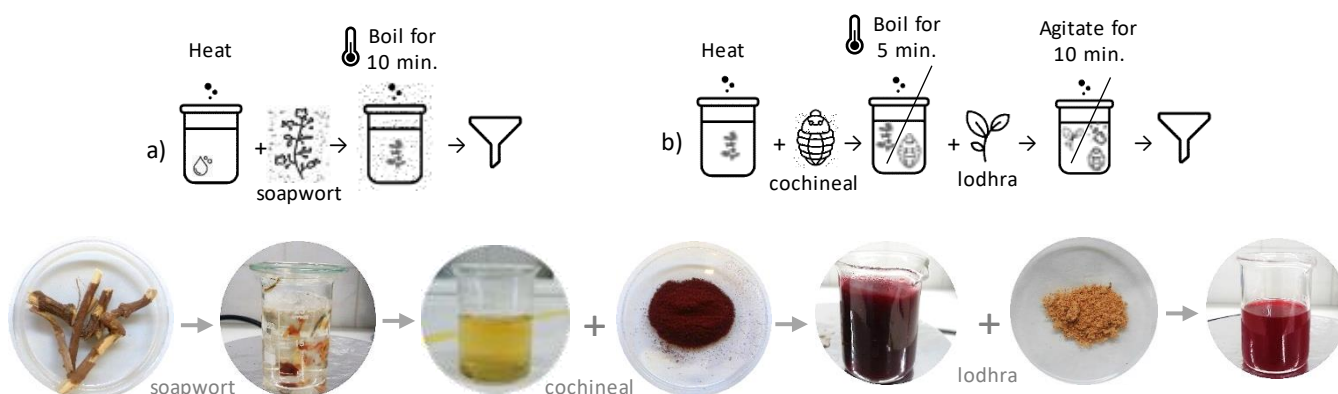
the already established protocol for each recipe (Appendix E). The quantities were reduced and adapted for 30 mL of water for each recipe. This reduction was done concerning the quantity of Armenian cochineal, considered for the next reproductions. Two recipes out of the selected four were separated: no. 7 and no. 10. Despite the little yield, they worked well with American cochineal and required less quantity of cochineal compared to no. 1 and no. 4. Recipe no. 10 used only lodhra with cochineal, while no. 7 lodhra together with alum.

From this, no. 10 was reproduced with *P. hamelii* three times following the same protocol, resulting in three versions. For no. 10 v.1 dry Armenian cochineal was used, and for no. 10 v.2 and v.3 the Armenian cochineal which was kept in the ethanolic solution (20%) and dried before the use. The triple reproduction was done following the instructions of the recipe (Table 7).

Table 7. The original recipe no. 10 (Ms. 4194, 19th century) represented in six steps, and its adaptation for the reconstruction, together with scheme and images of the steps of preparation.

On making cochineal

Original recipe	Reconstruction (measures adapted for 30 mL of water)
1. Take 1 dram (3,4 g) of cochineal (<i>catik</i>), 1 dram (3,4 g) of lodhra (<i>lut'ar</i>), 2 dram (6,8 g) of soapwort (<i>č'ōtan</i>) and 1 nuki (640 mL) of water.	1. Measure 0,17 g of cochineal, 0,17 g of lodhra, 0,34 g of soapwort, and 30 mL of water. Measure the pH of the water. Grind all the ingredients, split by hand the soapwort.
2. First add soapwort into the water, boil, then strain.	2. Bring the water to boil, add the soapwort and boil by agitating for 10 min., then filter and measure the pH.
3. And pour the water in a crock, boil it, and grind the cochineal and add into the water of soapwort, boil it once.	3. Put the soapwort solution on the heat again, add the cochineal and boil by agitating for 5 min.
4. Then grind the lodhra and add to cochineal, mix, and let cool.	4. Turn off the heat, add the lodhra and keep agitating for 10 min.
5. Then strain with a thin cloth and leave for 10, 3 (?) days, carefully skim off the surface water.	5. Filter the preparation, measure the pH, and let dry in a glass plate for 3-5 days.
6. And what is left in the bottom is a good cochineal, take and keep, and use with honey.	6. After, collect the dry pigment. Apply it on paper and parchment with binder.



Reproduction of the same recipe no. 10 both with American and Armenian cochineals resulted in different tonalities for either species. Hence, the recipe with American cochineal renders a deep red hue tending to blue, while the Armenian cochineal renders brighter red, tending to orange, and not as deep as the American one. We experimented longer than mentioned in the recipe extraction time, trying to obtain as much color as possible from the Armenian species, but even after a long period of agitation, controlled between one and three hours, the color of the extraction was not as deep as we expected. However, to obtain the least possible colors from Armenian cochineal, we opted to perform the second extraction from the residues remaining after the filtration of already prepared pigments. Therefore, the three second extractions were made following the same protocol for three versions of recipe no. 10 respectively. The second extractions resulted in pale pink colors, tending to yellow. After the pigments were dried, they have been collected and stored (Figure 32).

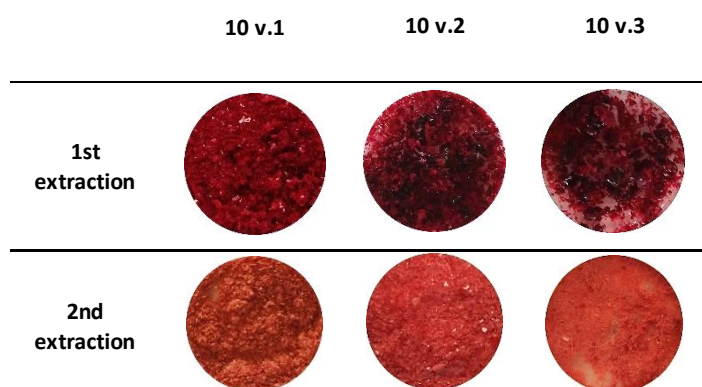


Figure 32. Collected dry pigments of Armenian cochineal prepared triply according to recipe no. 10. First row: the main recipe; second row: second extraction of the residue collected after the filtration of the main recipe.

Paints were prepared by grinding the pigments in a mortar and mixing them with gum arabic solution (20%) in the proportion of 30% of pigment to 70% of binder. Additionally, a part of the extended pigment on the gum arabic binder was separated and to it, five drops of sugar solution (80%) were added, as the recipe mentions to “*use it with honey*”. Both preparations with gum arabic and with the addition of sugar were applied on filter paper and parchment (Table 8, Table 9).

Table 8. Versions of recipe no. 10 reproduced with American cochineal (*D. coccus*), applied on paper and parchment with gum arabic, together with the color coordinates and final pH.











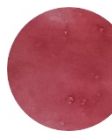
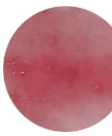

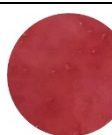



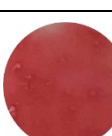
V	Final extract	pH	Paper gum arabic	L*	a*	b*	Parchment gum arabic	L*	a*	b*
1		4.4		46.37	45.84	11.28		50.63	47.32	9.47
3		4.5		44.33	47.73	13.81		46.75	53.35	12.25
4		4.6		45.61	48.15	13.06		45.90	51.39	14.54

Table 9. Versions of recipe no. 10 reproduced with Armenian cochineal (*P. hamelii*), applied on paper and parchment with gum arabic, together with the color coordinates and final pH.

V	Final extract	pH	Paper gum arabic	L*	a*	b*	Parchment gum arabic	L*	a*	b*
1		4.5		62.58	31.97	10.43		62.45	28.63	14.77
2		4.5		62.22	31.54	10.65		61.37	29.70	14.34
3		4.4		62.42	30.41	12.56		61.41	29.12	16.64

4.2.4. Materials

Armenian cochineal used for the reproductions was collected by us during the fieldwork in Armenia (September 2020), *S. officinalis* was purchased from a supplier of natural products, and *S. racemosa* was kindly provided by our colleagues from Matenadaran Institute. The alum used was reagent grade potassium aluminium sulfate ($\text{AlK}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$). Gum arabic (grains) was purchased from Kremer Pigmente.

4.2.5. Conclusions and Work in Progress

The study of reproduced Armenian cochineal recipes is in progress at this point. Several reconstructions of Armenian recipes provide indicative results that guide our next decisions, on the improvement of experimental protocols. Currently, two recipes are selected from which one is reproduced with American and Armenian cochineals. Two species, although with a similar percentage of carminic acid in the insect bodies, exhibit different behavior in the process of dye extraction. The same protocol applied to either species resulted in bluish reds for American and more pinkish reds for Armenian cochineal. By further detailed analyses, we will try to understand the specific features for both cochineal species, to correctly evaluate the obtained results.

In the next steps, the cochineal recipes and applied paints will be analyzed in-depth, and their chemical profile will be compared with organic reds found in original artworks that, in our case, are Armenian illuminated manuscripts from the Gulbenkian Museum, in Lisbon.

This work includes the following supplementary materials:

Appendix E - Armenian Cochineal Recipes: Schemes of the Preparation Process

Appendix F - Armenian Cochineal Recipes: Transcription, Translation, Glossary, and Measure Units

4.2.6. References

- [1] P'arpec'i, L. (1869) Collection des Historiens Anciens et Modernes de l'Arménie. V. Langlois (transl.), 2 vols, Paris, vol. II, p. 263.
- [2] Xorenac'i, M. (1881) Géographie de Moïse de Corène. P. Arsène Soukry (transl.), Venice, pp. 34, 46.
- [3] Chardin, J. (1686) The Travels of Sir John Chardin into Persia and the East-Indies; The First Volume, Containing the Author's Voyage from Paris to Ispahan, London, p. 351.
- [4] González deClavijo, R. (1782) Historia del Gran Tamorlan, Historia del gran Tamorlan e itinerario y enarracion del viage ..., 2nd edn, Madrid, don Antonio de Sancha, p. 82.
- [5] Donkin, R. A. (1977) The insect dyes of Western and West-Central Asia. *Anthropos, International Review of Ethnology and Linguistics* 72, pp. 847–80.
- [6] Kurdian, H. (1932) Ordan (Karmir) kam Kirmiz [Vordan (Red) or Kirmiz]. *Owsowmnasirowt'iwinner hay gelarowesti patmowt'ean hamar* [Studies for the history of Armenian fine art], Venice, San Lazzaro, pp. 31-43.
- [7] Kurdian, H. (1941) Kirmiz. *Journal of the American Oriental Society* 61, 2, pp. 105–7.
- [8] Mkrtychyan, L. (1973) K voprosu o lokalizacii krasnogo pigmenta v tele Araratskoj koshenili [On the localization of the red pigment in the body of the Ararat cochineal]. *Biologicheskij zhurnal Armenii* [Biological Journal of Armenia] 26, 8, pp. 75–8.
- [9] Mkrtychyan, L. (1976) Materialy po biologii razmnozhenija araratskoj koshenili (*Porphyrophora hamelii* Brandt) [Materials on the reproduction biology of the Ararat cochineal (*Porphyrophora hamelii* Brandt)], *Biologicheskij zhurnal Armenii* [Biological Journal of Armenia] 29, 8, pp. 44–52.
- [10] Sarkisov, R., Zakaryan, V. and Gasparyan, G. (1985) Migracija lichinok Araratskoj koshenili k kormovym rastenijam [Migration of Ararat cochineal larvae to forage plants], *Biologicheskij zhurnal Armenii* [Biological Journal of Armenia] 38, 8, pp. 714–17.
- [11] Cardon, D. (2007) *Natural Dyes: Sources, Tradition, Technology and Science*, London, Archetype Publications, pp. 612, 621–2, 649.
- [12] Cooksey, C. J. (2019) The red insect dyes: carminic, kermesic and laccaic acids and their derivatives. *Biotechnic & Histochemistry*, 94:2, 100-107. DOI: 10.1080/10520295.2018.1511065
- [13] Rosenberg, E. (2008) Characterisation of historical organic dyestuffs by liquid chromatography–mass spectrometry. *Anal Bioanal Chem*, 391:33–57. DOI: 10.1007/s00216-008-1977-0
- [14] Serrano, A. (2010) COCHINEAL, A PRECIOUS SOURCE OF RED - Cochineal Dyes Characterization by High Performance Liquid Chromatography with Diode Array Detection and Principal Component Analysis. Doctoral Dissertation, NOVA University of Lisbon, p. 12.

- [15] Wouters, J. (1985) High performance liquid chromatography of anthraquinones: analysis of plant and insect extracts and dyed textiles, *Studies in Conservation* 30, pp. 119–28.
- [16] Wouters, J. and Verhecken, A. (1989) The Coccid Insect Dyes: HPLC and Computerized Diode-Array Analysis of Dyed Yarns, *Studies in Conservation* 34, pp. 189-200.
- [17] Karapanagiotis, I. and Chryssoulakis, Y. (2005) Investigation of red natural dyes used in historical objects by HPLC-DAD-MS. *Annali di Chimica*, 95.
- [18] Karapanagiotis, I. and Karadag, R. (2015) Dyes in Post-Byzantine and Ottoman textiles: a comparative HPLC study. *Mediterranean Archaeology and Archaeometry*, 15, 1, pp. 177-189.
- [19] Keheyan, Y., Baraldi, P., Agostino, A., Fenoglio, G. and Aceto, M. (2016) Spectroscopic study of an Armenian manuscript from Biblioteca Universitaria di Bologna. *European Journal of Science and Theology* 12, 3, pp. 189–201.
- [20] Keheyan, Y., Aceto, M., Calà, E., Gulmini, M. and Idone, A. (2018) Characterisation of colorants on a 15th century Armenian manuscript by means of different spectroscopic techniques. *e-Preservation Science* 15, pp. 1–8.
- [21] Karapanagiotis, I., Verhecken-Lammens, Ch., Kamaterou, P. (2019) Identification of dyes in Egyptian textiles of the first millennium AD from the collection Fill-Trevisiol. *Archaeological and Anthropological Sciences* 11:2699–2710. DOI: 10.1007/s12520-018-0705-8
- [22] Serafini, I., Lombardi, L., Vannutelli, G., Montesano, C., Sciubba, F., Guiso, M., Curini, R., Bianco, A. (2017) How the extraction method could be crucial in the characterization of natural dyes from dyed yarns and lake pigments: The case of American and Armenian cochineal dyes, extracted through the new ammonia-EDTA method. *Microchemical Journal* 134, pp. 237–245. DOI: 10.1016/j.microc.2017.06.005
- [23] Avdalbegyan, S. (1963–4) Sahak episkopos Ter-Grigoryani hišataranə' [The Memoir of Bishop Sahak Całkarar Ter-Grigoryan], *Êjmiacin* 1963:12, pp. 36–43; 1964:1, pp. 32–9, 1964:4, pp. 48–56.
- [24] Galfayan, Kh. (1979) Araratyan vordan karmric' nerkanyut' stanalu Sahak Całkarari p'orjerə [The attempts of Sahak Całkarar to obtain a red colorant from Ararat cochineal]. *Bnagitut'yan ev texnikayi patmut'yunə Hayastanum* [History of Natural Sciences and Technology in Armenia] 7, pp. 116–30.
- [25] Galfayan, Kh. (1983) Polu enie kraski karmin iz araratskoj košenili [Obtaining carmine dye from Ararat cochineal]. *Hudo estvennoe nasledie. Hranenie, issledovanie, restavraciâ* [Artistic heritage. Preservation, study, restoration] 8, M.GosNIIR, pp. 75-86.

- [26] Keheyanyan, E., Eliazyan, G., Sahakyan, A., Khachatryan, H. (2008) Characterization of Ararat cochineal: a model study. Poster presented in 27th meeting of Dyes in History and Archaeology, Istanbul.
- [27] Kirby, J. and White, R. (1996) The identification of red lake pigment dyestuffs and a discussion of their use, *National Gallery Technical Bulletin*, vol. 17, pp. 56-80.
- [28] Vitorino, T., Otero, V., Carlyle, L., Melo, M. J., Parola, A. J. and Picollo, M. (2017) Nineteenth-century cochineal lake pigments from Winsor&Newton: Insight into their methodology through reconstructions, *ICOM-CC 18th Triennial Conference Preprints*, Copenhagen, ed. J. Bridgland.
- [29] Harutyunyan, A. (1941) Nerkeri ev t'anak'neri gorcacad'yunə hin haykakan jeřagrurum [The Use of Paints and Inks in Ancient Armenian Manuscripts], Yerevan, pp. 54-5.
- [30] Grigoryan, H. and Melo, M. J. (2018) Vordan Karmir: Evaluating lost Armenian cochineal recipes. Poster presented in 37th meeting of Dyes in History and Archaeology, Lisbon.
- [31] Grigoryan, H., Sahakyan, A., Melo, M.J. (2023) Vordan Karmir: An attempt to unravel the mystery of Armenian cochineal recipes for paints and inks used in manuscripts. *Dyes in History and Archaeology*, Kirby, J., Ed., Archetype Publications: London, UK, Volume 37/40, pp. 190–201.
- [32] Merrifield, M. P. (2010) *Medieval and Renaissance Treatises on the Arts of Painting: Original Texts with English Translations*. Dover Fine Art, History of Art.
- [33] Konkol, K.L., Rasmussen, S.C. (2015). An ancient cleanser: soap production and use in Antiquity. In: S.C. Rasmussen (ed.), *Chemical Technology in Antiquity*, American Chemical Society Symposium Series, Vol. 1211, Chapter 9, Washington, DC, p. 245-266.
- [34] Roquero, A. (2006) *Tintes y tintoreros de América*. Madrid, p. 69–81.
- [35] Cardon, D. (2007). *Natural Dyes: Sources, Tradition, Technology and Science*. London, Archetype, London, p. 32–6, 218, 625.
- [36] Jain, H., Vasantha, M. (2016). Eco friendly dyeing with natural dye – Areca nut; enhancing color fastness with natural mordants (myrobalan, lodhra and pomegranate) and increasing the antibacterial activity. *Archives of Applied Science Research* 8, 8, p. 1-7.
- [37] Loba, R., Prabhu, K. S., Shirwaikar, A., Shirwaikar, A. (2009). *Curcuma zedoaria* Rosc. (white turmeric): a review of its chemical, pharmacological and ethnomedicinal properties. *Journal of Pharmacy and Pharmacology*, 61, p. 13–21.
- [38] Papazean, I. (1824). *Account Book of Commerce*. San Lazzaro, Venice.
- [39] Papazean, I. (1826). *Copies of Commercial Letters*. San Lazzaro, Venice.



CHAPTER 5

Detail, bird-ornament, LA 193, p. 5

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DOI: 10.3390/heritage6030170.*

5. ART CHEMISTRY

This Chapter presents the results obtained through scientific analysis of the manuscripts under the scope. The first technical examination revealed a wealth of information on material aspects of our study material, with this, offering more insights to be studied in the future.

5.1. Exceptional Illuminated Manuscripts at the Gulbenkian Museum: The Colors of a Bible and Three Gospels Produced in the Armenian Diaspora

Abstract

The illuminated manuscripts at the Gulbenkian Museum were produced in the 17th century, in *scriptoria* of the Armenian diaspora. In this work, we selected analytical methods that can be used in situ to study the colors of the illuminations. Scientific analysis based on fiber-optics reflectance spectroscopy in the visible and Raman spectroscopy has shown the use of a medieval palette based on inorganic pigments such as lapis lazuli, minium, vermilion, orpiment, indigo, two different greens (vergaute and malachite), lead white and carbon black. More importantly, in this context, it showed that the very important reds and pinks are possibly based on carminic acid. The painting technique is, however, different, as are the ways of painting the faces, hands, and vestments. The range of colors in the Bible and the three Gospel Books, enhanced by lapis lazuli blue and organic reds and pinks, demonstrates a desire to create exceptional illuminated manuscripts.

5.1.1. Introduction

5.1.1.1. Illuminated Manuscripts Produced within the Armenian Diaspora in the 17th Century

Illuminated manuscripts comprise one of the major fields of Armenian art and receive scholarly attention steadily. The main hub for these precious artworks is the Matenadaran Institute of Ancient Manuscripts in Yerevan. Apart from that, there are numerous Armenian manuscripts preserved in collections worldwide. To unveil these codices as hidden gems is such a delight for a researcher. Our group had the possibility to explore a collection of four

Armenian manuscripts (LA152, LA193, LA216, LA253) preserved in the Gulbenkian Museum in Lisbon.

Four manuscripts were acquired by Calouste Gulbenkian during his lifetime from different art dealers [1]. They became a part of the permanent exhibition of the Gulbenkian Museum since the very beginning of its establishment. The collection includes one Bible (LA152) and three Gospel Books (LA193, LA216, LA253). The preserved colophons indicate the place and date for the manuscripts as follows: LA152, Constantinople, 1623; LA193, Crimea, 17th century; LA216, 1686, Isfahan (New Julfa). LA253 does not possess any colophon, but based on its miniature style it was attributed to the 17th century school of Constantinople. Each manuscript is unique on its own, with an interesting biography and exquisite art of illuminations. Our larger discussion on manuscripts' art, history, and colophons can be found in [2,3].

As already mentioned, this group of manuscripts was produced within the Armenian diaspora communities of Constantinople, Isfahan, and Crimea, during the 17th century, as shown in Figure 33. These communities were prospering centers of Armenian trade and artistic production patronaged by the wealthy merchant class. The three centers were interconnected through the dynamic mobility of people that promoted the circulation of goods and ideas between them. At the same time, these communities shared wider connections globally, from East to West [4]. The artistic production of this period, developed beyond the historical frontiers of Armenia, is distinguished by its eclectic style. This style is strongly characterized by the continuity of Armenian medieval local traditions and contacts with European art conveyed by the Crusaders in the Latin Kingdoms of Cyprus, Antioch, and Jerusalem. It is in the Kingdom of Cilicia (1198–1375), open to the Mediterranean, that Armenian art has its apogee and where, in the 13th century, flourish the *scriptorium* of Hromkla (present-day Rumkale, Gaziantep, Turkey), and the legacy of Toros Roslin, scribe and illuminator of seven dated manuscripts. The inheritance of Byzantine and Seljuk art intersects here as well [5]. These broad connections can be particularly observed in the manuscript art of the 17th-century Armenian diasporas, where the local artistic traditions are very often conjoined with new westernized inspirations [6,7]. It has been suggested that these diaspora workshops bear influences from traditional Armenian schools, particularly from Cilicia, as well as from Byzantine and Western art [8–10]. Therefore, the Gulbenkian group of Armenian manuscripts offers the possibility to study the manuscript production of the last Armenian *scriptoria*, and to evaluate the art and craftsmanship of miniature workshops of Constantinople, Isfahan, and Crimea.

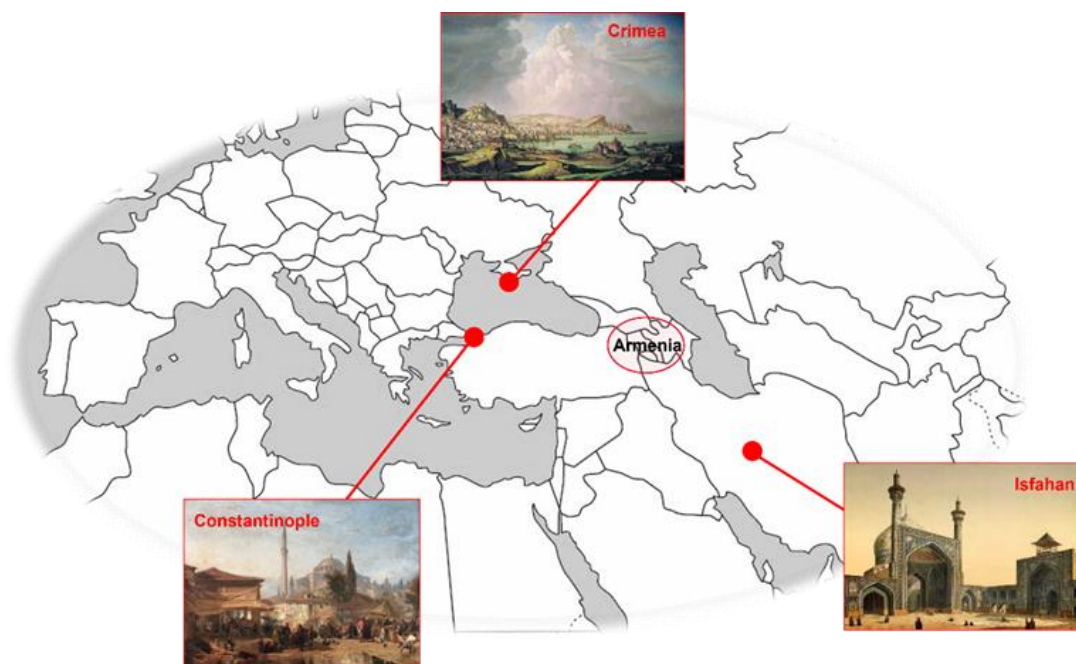


Figure 33. Localization of the manuscript production centers, Constantinople, Crimea, Isfahan (New Julfa), and present-day Armenia.

In the present study, we aim to explore the color palette applied in these four Armenian manuscripts and in future work to characterize the complete paint formulations, including binders and additives, Figures 34–37. Our specific interest is in the organic-based colorants, with hues ranging from pink to carmine and purple, which in future work we will study in depth to verify whether they were made with Armenian cochineal [11].



Figure 34. Bible LA152 (1623), produced in Constantinople (224 165 mm), from left to right: “Creation”, p. 13; “Revelation” (title-page of the Book of Genesis), p. 14. © Gulbenkian Museum.



Figure 35. Gospel LA253 (17th century), produced probably in Constantinople (154 x 114 mm), from left to right: “Evangelist Matthew,” f. 28v; “Crucifixion” f. 13r. © Gulbenkian Museum.



Figure 36. Gospel LA216 (1686), produced in Isfahan/New Julfa (108 x 79 mm), from left to right: “Canon Table” f. 5v; “Tree of Jesse” f. 16r. © Gulbenkian Museum.



Figure 37. Gospel LA193 (17th century), produced in Crimea (176 x 133 mm), from left to right: “Canon Table” p. 12; “Temptation in the desert” p. 41. © Gulbenkian Museum.

5.1.1.2. Multi-Analytical Approach and Previous Studies

Identifying the colorants in the Armenian illuminations is based on the UV-Visible spectra acquired with FORS (Fiber-Optics Reflectance Spectroscopy) and Raman's spectra acquired with handheld equipment. The study starts with acquiring the UV-Visible spectra, which will guide the points of analysis by Raman. The data obtained will allow proposing a first molecular palette of the colorants used by comparison with paint reproductions prepared with as much historical accuracy as possible [12–15]. It is complemented with Energy dispersive X-ray fluorescence spectrometry (XRF) to confirm the presence of gold and other inorganic pigments. In future work, the complex formulations used in these colors will be explored using infrared spectroscopy and fluorescence spectra in the visible, which will make it possible to determine the binding media used and the specificities of the organic-based reds [12,15].

This work will compare the main colorants identified with previous studies on Armenian manuscripts summarized in Table 10. This table is based on the information collected in Tables S1 and S2. Previous studies exploring the materiality of Armenian manuscripts include important works by two main groups: Orna and co-workers, and Keheyian and co-workers, and complemented by other studies [16–30]. Orna, Cabelli and Mathews's collaboration were the first to study the pigments of Armenian illuminations systematically. Their examination of 24 manuscripts using mostly elemental analysis draws the overall image of the Armenian medieval palette, Table 1. This chronology expands by studies of Keheyian and co-workers, based on manuscripts from different miniature schools, and being the first to implement Raman microscopy in this process. Indeed, understanding the nature of all the components of such complex objects as codices, i.e., binding, parchment or paper, inks, and pigments, will widen our knowledge of the specificities of the production process, artistic techniques, paint and ink formulations, and much more. Such knowledge is indispensable for manuscripts' conservation and restoration and may contribute to a number of areas, ranging from art history and technology to socio-economic and cultural history.

5.1.1.3. Overview of the Medieval European Palette

Medieval colors used in illuminated manuscripts, from the 12–15th centuries, were based on a luxurious and restricted palette dominated by a certain number of inorganic pigments and organic dyes. The medieval codex, with the Bible as its foundation, started in the monastic *scriptoria* and evolved into lay workshops for the production of books of hours. During this period, some pigments were replaced, allowing us to discuss when these manuscripts were made within a specific context. In the monastic world, color also had a significant symbolic meaning [31–35].

Table 10. Selection of the main pigments described in Armenian manuscripts ranging in date from the 10th to the 17th centuries, based on the works of Orna et al. in the 1980s, and Keheyan et al. in the 2000s. Mostly inorganic pigments were identified, and, more infrequently, organic dyes.

Most used pigments	Less used pigments	Mixtures
Lapis lazuli	Indigo	Green
Vermilion	Azurite	Yellowish green
Red lead (minium)	Smalt	Purple
Orpiment	Yellow ochre	Orange
Gold leaf	Organic yellow	Brown
Organic red	Malachite	Flesh
Lead white	Verdigris	
Carbon black		

In the most important manuscripts, lapis lazuli was the main blue [31,35,36]. Indigo was also used to shadow, as well as a single color, or admixed with yellows or reds to create greens (vergaut) and purples [37,38]. Azurite was the other important blue [35].

For the reds, vermilion and red lead (minium) were the main inorganic pigments, and although minium is orange it was incorporated in the sphere of reds [31,35,39]. Lac dye and brazilwood produced pigment lakes ranging from dark reds, carmines, and pinks, which could be opaque or translucent [12,15,31,40,41].

Orpiment was one of the essential yellows in monastic production, being replaced by mosaic gold and lead-tin yellow from the 14th century onwards, being an important color in books of hours [31,35].

A durable green was a difficult color to produce in medieval times; in Bibles, Gospels, and other religious texts produced during the 8–12th centuries, there is evidence that a very saturated green color was used. It was identified as a proteinaceous copper green in Portuguese monastic production dated from the 12–13th centuries (it was named bottle green) [12,31]. Malachite and other basic copper sulfates were used in books of hours [12,35,42].

White was essentially produced with lead white, but there are examples of the application of calcinated gypsum (anhydrite) in precious manuscripts such as the Book of Kells [12,38]. Blacks were carbon black or bone black.

Gold and silver were also profusely used in important manuscripts, applied as leaves or inks.

Crucial for the preservation of these paints was their formulation, which includes the binding media, hereafter referred to as tempera. Tempera could be based on proteins or polysaccharides [12,14,43,44]. Medieval treatises also describe mixtures of both [14,43,44]. For medieval illuminations, protein-based tempera could be prepared using egg white (glair) or

parchment glue; the use of small amounts of egg yolk is also sometimes described; it is possible that it was a relevant component in vermilion colors. The most important polysaccharide in medieval treatises is gum arabic [43,45]. We have evidence that other types of gums of this family, such as mesquite gum, were also employed [13,46,47]. Protective varnishes would have been applied and could have similar formulations to tempera.

5.2.1. Results and Discussion

5.2.1.1. The Molecular Palette Used to Produce the Colors of the Bible and the Gospels

The main colorants used in the four manuscripts studied are the same, and the molecular palette is represented in Figure 38. The painting technique is, however, different, as are different the ways of painting faces, hands, and vestments, which are discussed in Section 5.2.1.9. More details on the painting technique are found in Appendix G. The areas of analysis and spectral information are described in Appendix H and J, respectively.



Figure 38. The molecular palette for the studied manuscripts with details from Gospel LA193 (17th century, Crimea), as well as one, the blackbird, from Gospel LA216 (1686, Isfahan). Lapis-lazuli and vergaut are the main blue and green colors in three of the manuscripts; in Gospel LA253 (17th century, Constantinople) azurite is the main blue and in Gospel LA193 malachite is the main green.

Lapis lazuli is the main blue, except for Gospel LA253, in which azurite is also an important pigment in the illuminations. This azurite blue is usually used to paint the initials. Indigo is also applied to darken colors and to create light blues, admixed with lead white. The most important color is, possibly, the organic-based red, also used to create pinks and purples, as shown in Figure 39. It is used in the contours, as a ground for gold, to draw details over the faces, vestments, and architecture details, and to create many other decorations in the margins, Sections 1–4, Appendix G. The reflectance spectra acquired in the visible point out to a color based on carminic acid obtained from a scale insect [48]. The other **inorganic reds** are vermilion and minium. However, Raman spectroscopy detected essentially vermilion in orange and red colors, and minium was seldom identified. XRF data shows, on the other hand, that minium is ubiquitous, as shown in Appendix J.

Pinks are prepared by admixing the organic-based red with lead white. In Gospel LA216 (Isfahan), calcium carbonate is also identified in addition to lead white to create the pink color. For purples, this red is combined with blue; it is lapis lazuli for the Bible and Gospels LA193 (Crimea) and LA216 (Isfahan), while in Gospel LA253 (Constantinople), it is indigo.

It is interesting to observe the use of the very poisonous **orpiment** as the main yellow. The conservation condition of this color in the Bible and the three Gospels is discussed in Sections 1.2, 2.2, 3.2, and 4.2 in Appendix G. Possibly, in some manuscripts, the rather pale yellow now observed was more saturated. The other yellow color identified is an ochre that is used in Gospel LA216 (Isfahan).

Greens and **blacks** will be only tentatively discussed in this paper, and will be further explored in future works. Both FORS and Raman spectroscopy detected two different greens, one based on vergaut and the other on malachite. Vergaut is obtained using orpiment and indigo, and it is the main green in the Bible LA152 and the Gospels LA216 and LA253 (produced in Isfahan and Constantinople, respectively). Malachite is the main green in Gospel LA193 (Crimea). Raman indicates that blacks are based on carbon blacks.

White is always **lead white**, and it is applied in a similar way to what was observed in medieval times; highlights created with it usually have a low amount of tempera, and inside, there is a void [12,49]. For this reason, it is easily detachable and, therefore, a fragile color. This white also creates lighter colors, such as pinks and light blues.

5.2.1.2. Gold

Gold is prominently used in the four manuscripts on backgrounds, ornaments, and text. Gold has a homogeneous appearance, especially in Bible LA152. However, there are several areas of gold loss and detachment in both paint layers and written text. Pure gold (nor silver nor copper was detected) was identified using XRF.



Figure 39. Application of organic-based reds/carmines/purples in Gospel LA216 (1686, Isfahan). Used as an outline, ground layer, and color (details obtained with a Leica microscope).

5.2.1.3. Other Blues

Cobalt and other elements associated with cobalt minerals (nickel, arsenic, and bismuth) were identified in some of the blues present in the Gospel LA 216 (Isfahan). This blue was detected in the calf representing the evangelist Luke (141 v) and in the vestment of the evangelist John (213 v). Furthermore, potassium and silicon were also present, indicating the use of a blue cobalt-containing potassium glass pigment. Thus, a first hypothesis of the use of smalt could be anticipated. However, this needs to be confirmed with further research.

5.2.1.4. Fiber-Optics Reflectance Spectroscopy as First Screening for the Study of the Colorants

Fiber-optics reflectance spectroscopy allowed for the screening of the main colorants present. The blue colorants identified are lapis lazuli, indigo, azurite, and mixtures of these colorants (Figure J1a,b, Appendix J). In LA152 and LA216, the only blue identified is lapis lazuli. LA193 also has blues prepared with a mixture of lapis lazuli and indigo. In LA253, azurite is also identified. In this manuscript, lapis lazuli is applied in the frames of

illuminations and on some vestments; azurite is here the main blue and is used for vestments and architecture.

The greens are prepared using a mixture of a yellow and a blue colorant. Only in LA152 and LA193 is malachite identified as a source of a light green (Figure J2, Appendix J). In LA152, malachite is identified in floral details and frames, while for LA193, it is present in architecture and vestments (Figure J2b, Appendix J). Vermilion is detected in the reds and oranges (Figure J3, Appendix J). It is identified in all manuscripts, either alone or in mixtures with a yellow pigment and also minium, as demonstrated by the shift of the inflection point to lower wavelengths (Figure J3, Appendix J).

The yellows of all manuscripts are prepared using a yellow pigment, possibly orpiment. A yellow ochre is only present in LA253, Figure 40a. In LA152 and LA216, an unidentified yellow color is also detected, which could be an organic yellow or an aged tempera or varnish, Figure 40b.

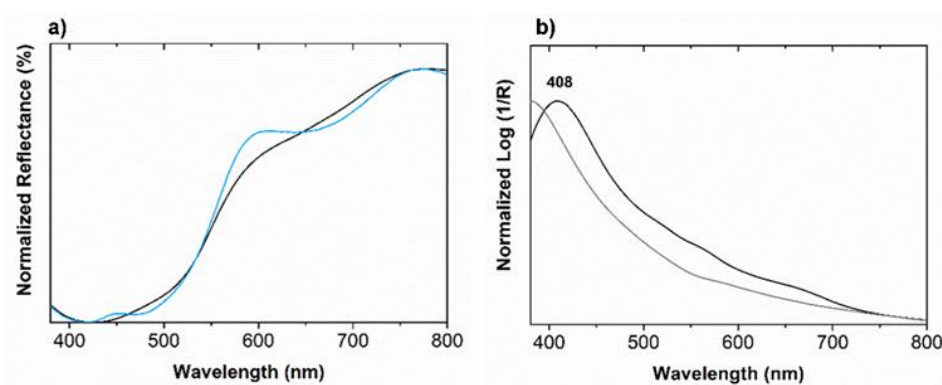


Figure 40. Apparent absorbance spectra of yellow colors, in (a) in LA253 f. 12v (black line), and a yellow ochre reference (blue line); (b) in LA216 f. 141v (black line) compared with parchment acquired in the same folio (grey line), to be identified.

The organic reds and pinks are identified as an anthraquinone-based dye from an animal source. FORS allowed for the distinguishing of two main colors: a pink and a red hue, both present in all manuscripts. The pink is characterized by an absorbance maximum at ca. 520–525 nm with a shoulder at 559–562 nm, and the red hue by an absorbance maximum at ca. 513–517 nm with a shoulder at 552–556 nm, see Figure 41a. The pink formulation is also used as a preparation layer for the gold (LA216) and as writing ink (LA193) (Figure 9b). Finally, the purples are identified as a mixture of an anthraquinone-based dye and two different blue colorants, possibly indigo and lapis lazuli, see Figure 41c,d.

The areas of analysis where the best signals were obtained with FORS were selected and analyzed with Raman spectroscopy to confirm and complete the information obtained.

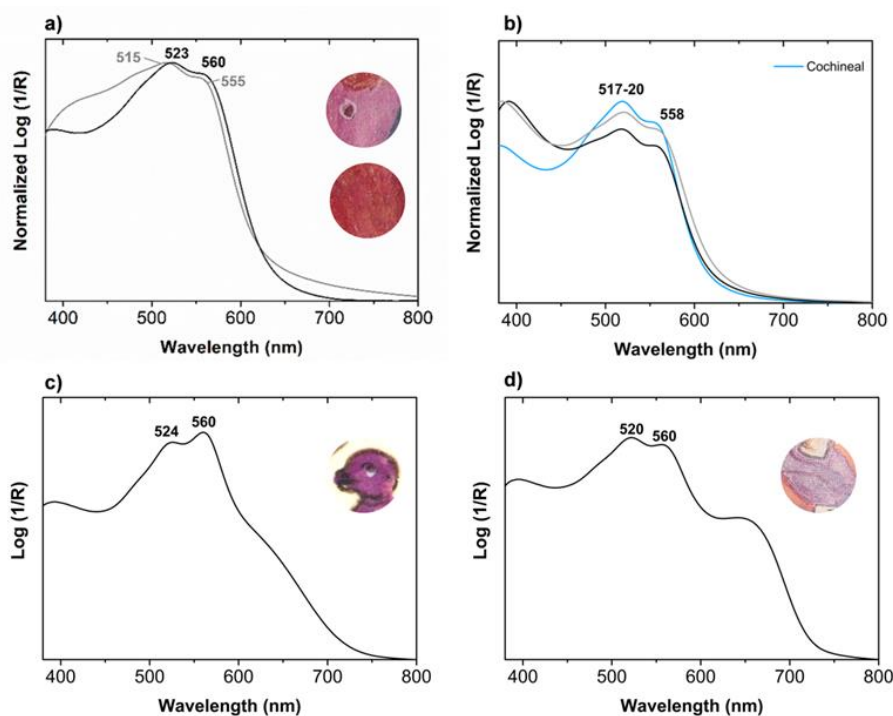


Figure 41. Apparent absorbance spectra of paints based on anthraquinone dye of animal origin: (a) pink color (black line) and red color (grey line), from LA193 p. 32; (b) applied as a preparation ground for gold, in LA216 f. 4r (black line) and as writing ink, in LA193 p. 168 (grey line), compared with a paint based on American cochineal (blue line); anthraquinone-based paints admixed with a blue colorant: (c) LA216 f. 4r and (d) LA193 p. 168.

5.2.1.5. Raman Spectroscopy for Identification of the Colors of the Bible and the Gospels

5.2.1.6. Inorganic Compounds

Raman spectroscopy allowed us to confirm some identification previously proposed by FORS, but also to identify mixtures of colorants and the use of lead white or fillers, such as calcium carbonate. It confirms the presence of lapis lazuli through lazurite in all four manuscripts and indigo in LA193 and LA253. In LA152, lapis lazuli is highlighted or lightened using lead white (Figure 42a). This is also the case with LA216, where calcium carbonate is also added to some blues. Two other mixtures found are lapis lazuli, indigo, and lead white, and another with the addition of calcium carbonate to the previous assembly (Figure 42b,c). See Figure 42d for examples of the application of these mixtures.

For the greens, three mixtures are identified: (i) orpiment and indigo, the most used in all four manuscripts, Figure 43a; (ii) orpiment and lapis lazuli, only present in LA152, Figure J4, Appendix J; and (iii) unidentified yellow and indigo, present in LA152 and LA193.

Moreover, these colors were also prepared using lead white and/or calcium carbonate, as seen in LA193, Figure 43b.

For reds and oranges, vermilion is the main colorant used, as previously identified by FORS. Raman spectroscopy identifies the use of lead white to lighten the color in LA152 and LA193. Contrary to what is found in Portuguese medieval illuminations, minium is not found as a pure color, but always in a mixture with vermilion or orpiment, this last is represented in Figure 44a. Mixtures using vermilion are also identified: with orpiment, in LA152 and LA216 (Figure 44c); with minium, in LA152, LA193 and LA216 (Figure 44b). Moreover, the use of realgar is detected pure, in two manuscripts, LA152 and LA193, and in a mixture with orpiment, in LA216. The yellows, apart from those identified by FORS, orpiment, and a mixture of orpiment and realgar, are also identified (Figure 45a). Again, lead white is used to lighten the yellow from the orpiment, as shown in Figure 45b.

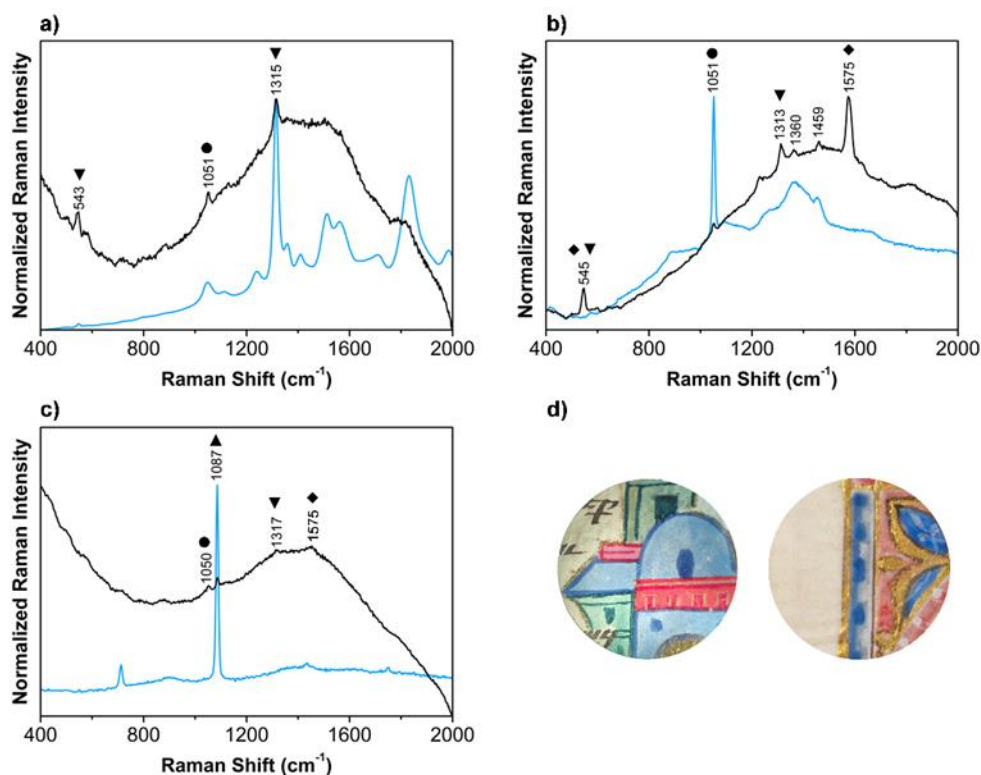


Figure 42. Raman spectra of the blue colors (black lines) are compared with references (ref.) (blue lines), prepared as gum arabic tempera and applied in parchment, for: (a) LA152, a mixture of lead white and lapis lazuli compared with lapis lazuli ref.; (b) LA193 and LA253, a mixture of lead white, lapis lazuli, and indigo compared with lead white ref.; (c) LA216, admixed with calcium carbonate lead white compared with calcium carbonate ref.; (d) details of the illuminations in LA193 (left) and LA216 (right). The main bands detected are assigned to lapis lazuli (▼), indigo (□), lead white (●), and calcium carbonate (▲).

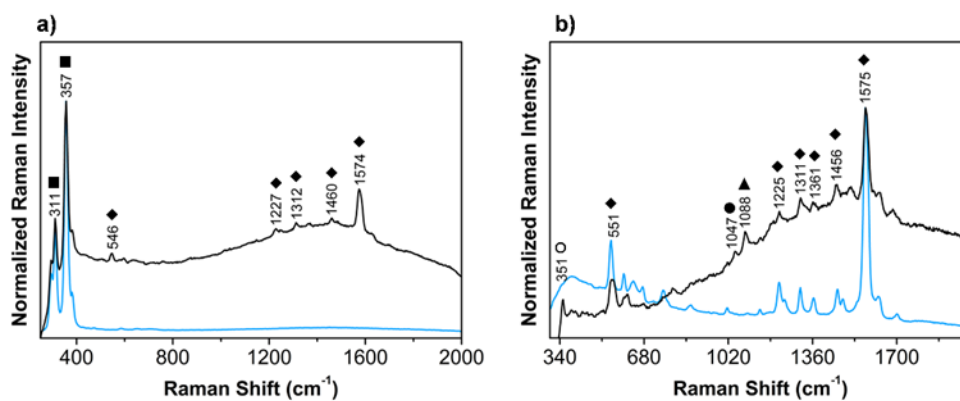


Figure 43. Raman spectra of two green colors (black lines) are compared with references (ref.) (blue lines), prepared as gum arabic tempera and applied in parchment, for: (a) vergaut, indigo and orpiment, which is identified in all manuscripts, compared with orpiment ref.; (b) LA193, as a mixture of realgar, calcium carbonate, lead white and indigo compared with the indigo ref. The main bands detected are assigned to indigo (◇), realgar (○), orpiment (■), calcium carbonate (▲) and lead white (●).

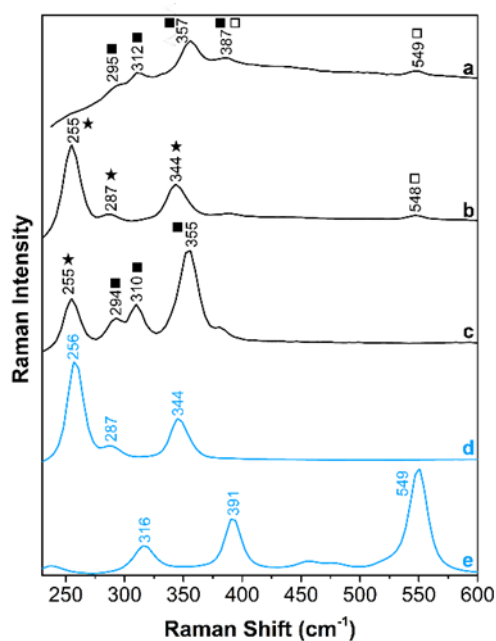


Figure 44. The red and orange pigments are identified as vermilion, the most used, and mixtures. The Raman spectra of three orange colors (black lines) found in: (a) f. 11v of LA216 as a mixture of orpiment and minium; (b) LA152, LA193, and LA216, as a mixture of vermilion and minium; (c) in LA152 and LA216, as orpiment with vermilion. The main bands detected are assigned to vermilion (★), orpiment (■) and minium (□). References (blue lines), prepared as gum arabic tempera and applied in parchment, for (d) vermilion and (e) minium.

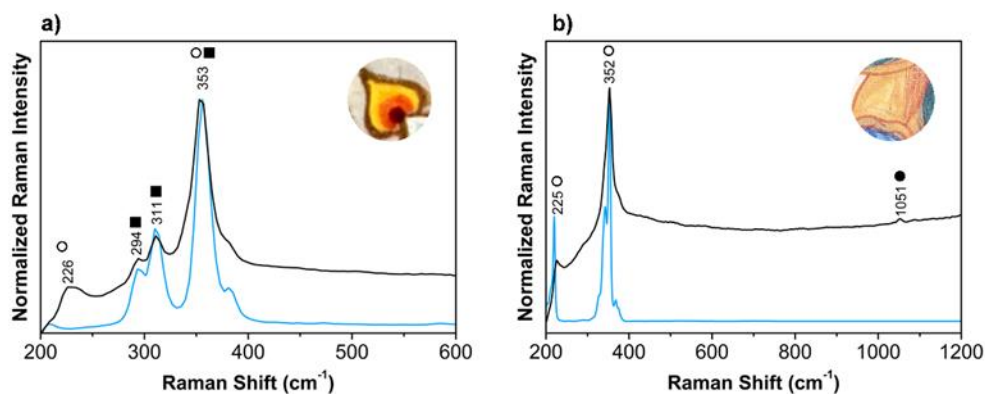


Figure 45. Orpiment and mixtures of this colorant with realgar and lead white were identified for the yellows. Raman spectra for the yellow colors (black lines) are compared with references (blue lines) for: (a) LA152 and LA216 as a mixture of realgar and orpiment; (b) LA193 as a mixture of realgar and lead white. The main bands detected are assigned to realgar (○), lead white (●), and orpiment (■).

The browns and greys are characterized by the presence of carbon black, in all manuscripts. In LA152 and LA193, the browns are prepared using minium (see Figure J5, Appendix J) and orpiment, respectively (Figure 46a). However, the addition of vermilion is more frequently detected (Figure 46b). For the grey colors, characterized only in LA216 and LA253, lead white (Figure 46d) and calcium carbonate (Figure 46f) (only in LA216) are added to the carbon black (Figure 46c,d).

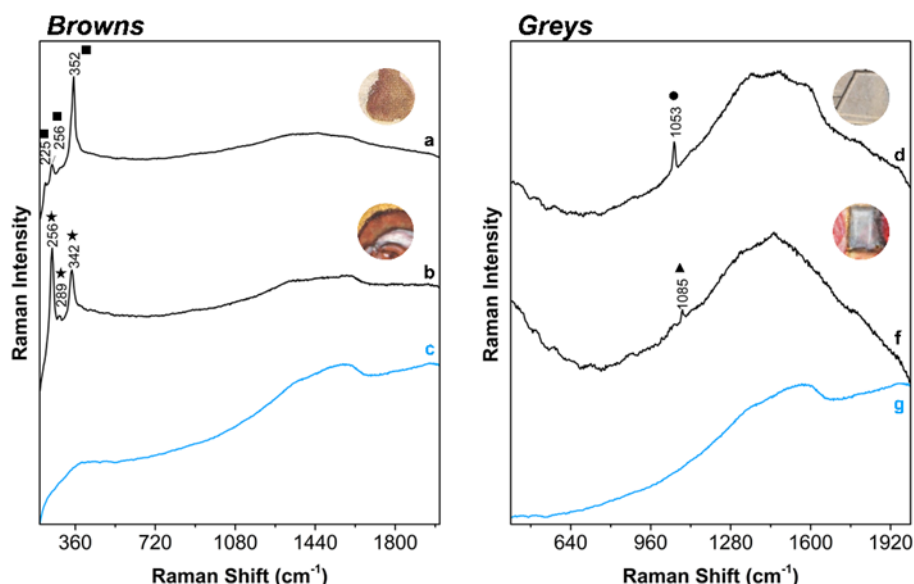


Figure 46. Raman spectra of the browns (left) and greys (right). The browns resulting from the mixture of carbon black with: (a) orpiment were found in LA193 and (b) vermilion was found in all the manuscripts. The greys were obtained using carbon black admixed with a white compound: (d) lead white in LA253 and LA216; (d) calcium carbonate for LA216. The main bands detected are assigned to orpiment (■), vermilion (○), lead white (●) and calcium carbonate (▲). Carbon black reference (blue lines), prepared as gum arabic tempera and applied in parchment, (c,g).

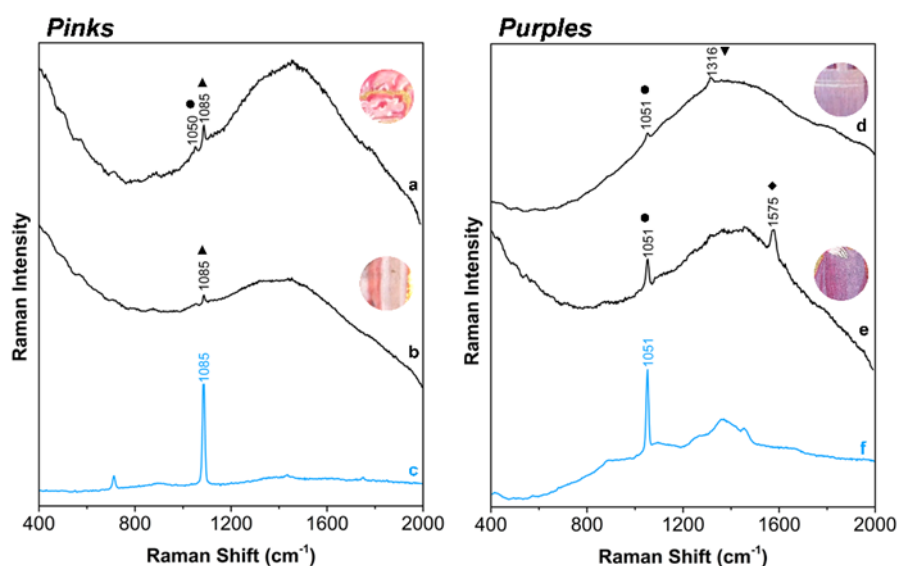


Figure 47. Raman spectra of the pinks and purples. Organic pinks were applied with (a) lead white and calcium carbonate in LA216 or with (b) calcium carbonate alone. The purples result from the mixture of a red dye and: (d) lapis lazuli in LA152 and LA216, (e) indigo in LA193 and LA253; and, except for LA216, all the paints present as additive lead white. The main bands detected are assigned to lead white (●), calcium carbonate (▲), lapis lazuli (▼), and indigo (◆). (c) Calcium carbonate and (f) lead white references (blue lines) are prepared as gum arabic tempera and applied in parchment.

5.2.1.7. Reds and Pinks Based on Organic Dyes

The organic red and pink colors, previously characterized by FORS, are prepared with lead white and/or calcium carbonate, used as fillers or to lighten the color. Lead white is detected in LA152 and calcium carbonate in a mixture with lead white (Figure 47a) or alone (Figure 47b) in LA216. In LA152, a salmon color is characterized by a mixture of an anthraquinone-base dye (detected by FORS) and orpiment, Figure J6, Appendix J. The blue colorants used for the purple colors are lapis lazuli, in LA152 and LA216, and indigo, in LA193 and LA253 (Figure 47c,e). To this red and blue mixture, lead white is always added (reference in Figure 47f).

Raman analysis of fluorescent dyes is complicated and is best done by SERS, which requires microsampling [50]. Therefore, with Raman spectroscopy, it was not possible to identify the organic red.

5.2.1.8. Writing Inks

The black writing inks are characterized as iron-gall inks through their Raman spectra. Iron-gall inks are prepared using a polyphenolic extract from galls, an iron salt, usually iron sulfate, and gum arabic to keep the precipitate formed in suspension. This formulation provides a very dark ink which has been used since antiquity. The main peaks that allowed for the identification of iron-gall inks are at around $500\text{--}600\text{ cm}^{-1}$, 1335 cm^{-1} , and 1479 cm^{-1} , Figure 48. The blue and red initials were prepared using lapis lazuli and vermilion, respectively.

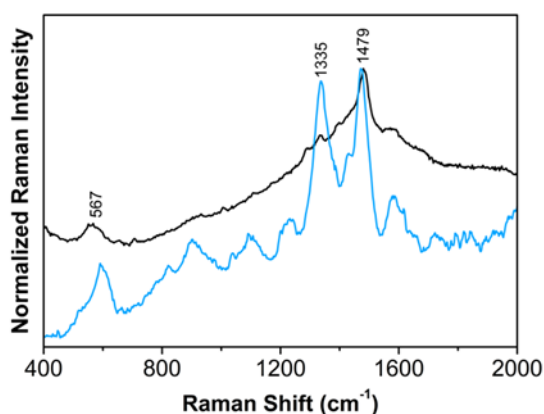


Figure 48. Raman spectrum of iron-gall ink found in f. 1210r, from LA152 (black line) and reference spectra of a reference iron-gall ink (blue line). This Raman spectrum is representative of iron-gall ink signals of all four manuscripts.

5.2.1.9. Painting Technique

The paratext in the four manuscripts is organized according to the text-image relationship commonly found in Armenian manuscripts - the main chapters and essential passages of sacred texts are usually indicated with marginal ornaments of vegetal patterns; the text begins with zoomorphic, anthropomorphic, ornated, or bird-letters, Figure 49 and Appendix G (Section 5); titles and the following two-three lines are usually majuscule letters written in alternating red, blue, and gold inks; the main text is in black, with neat lines and regular calligraphy. In the case of the Bible, the narrow headpieces of interlaced vegetal patterns are provided at the beginning of the chapters, Figure 49. Content-related small narrative miniatures can be found within the text. The fully illuminated pages usually include the portraits and title-pages of the four Evangelists, the cycle of the Eusebian letter followed by the Canon Tables, and the cycle representing the life of Christ typical for Gospel Books. Both figurative and ornamental illuminations are performed by skillful artists, each unique in its own way. As far as painting techniques are concerned, the artists seek to be as close as

possible to their medieval counterparts, in how the colors are applied, dark and light shades are worked, or forms are modeled in these four manuscripts. The impression is that the ornaments, in general, were first outlined with red and then redrawn with gold ink, as shown in Figure 39 and Appendix G (Sections 3.1 and 5). A similar process was followed for the majuscule letters in gold, and for anthropomorphic, zoomorphic, or bird-letters. A similar approach was implemented in the outlines for the figures in LA193, where the gold was replaced by fine black lines so that both red and black outlines can be seen complementing one another, as shown in Appendix G (Sections 4.1 and 5). The small marginal figures in LA253 seem to be re-drawn with black. This approach of the initial sketching of the illuminations with red is quite common in Armenian manuscripts.



Figure 49. Details of incipit letters, headpiece patterns and marginal ornaments in the four manuscripts.

A preserved Armenian painters' manual from 1618 (BnF MS Arménien 186) describes some drawing techniques that are traceable in our manuscripts [51,52]. These include mixing ochre with black and drawing the faces, hands, and feet, then redrawing them with purple, or drawing with black and then shading it with red. It also suggests lightening the faces with a

mixture of purple and white, or modeling the facial features by applying white and red on the noses, cheeks, foreheads, mouths, necks, hands, and feet. The manual mentions paint mixtures as well: red with black for deep purple, red with white for light red, red with lapis lazuli for light purple, red with indigo for medium purple, indigo with yellow for dark green, and lapis lazuli with yellow for light green. Finally, to create shades, it suggests indigo for lapis lazuli, light green for dark, and carmine for red.

Drawing lines and brushstrokes are delicate in LA152, LA253, and LA193, while they are thick in LA216, possibly because of the small dimensions of the book. A similar approach was also observed in the minute illuminations of a book of hours [53], as shown in Appendix G (Section 6). White is used to highlight the ornaments, vestments, mountains, and architectural details in all four manuscripts (Figures 49–51). More information on painting techniques is available in Appendix G.

Different technical approaches can be noticed in the full-page illuminations, particularly in portraying the figures, as shown in Figure 51. In LA152, the faces, bodies, and hair are drawn with brown. Hairs and beards are painted dark to light brown and greyish. Flesh tones are likely constructed on a light pink ground layer and modeled with abundant white and some reddish hues. Voluminous white spots and lines are prominent under magnification in highlighting noses, cheeks, foreheads, and the whites of the eyes. Mouths are marked with an orange/red single brushstroke. Hands and feet are highlighted with white and sometimes with pink, as shown in Figure 51 and Appendix G (Section 1.1).

In LA216, the faces, bodies, and hair are drawn in black or dark brown, as shown in Figure 51 and Appendix G (Section 2.1). Hair and beards are painted brown. Flesh tones are likely constructed on a dark brown ground layer and modeled with heavy white brushstrokes and black lines. Both dark brown and white layers are thick and coarse in texture. Mouths are marked with double white lines. Hands and feet are highlighted with white as well. Unlike the other manuscripts, pink or red tones are not used for highlighting.

In LA253, the faces, bodies, and hair are drawn with thick brown lines, as shown in Figure 51 and Appendix G (Section 2.1). The eyes and eyebrows are marked with black. Hairs and beards are painted brown. Flesh tones are likely constructed on a dark brown ground layer and modeled with greyish white. Tiny pink brushstrokes are visible on cheeks, foreheads, noses, and mouths. Hands and feet are highlighted with greyish white and some pink. Under the microscope, tiny white dots are visible in the joints of the fingers, which is an exciting approach to creating the impression of flexibility. In terms of flesh tones, this manuscript resembles LA216 but with a less coarse texture and with the presence of pinks.

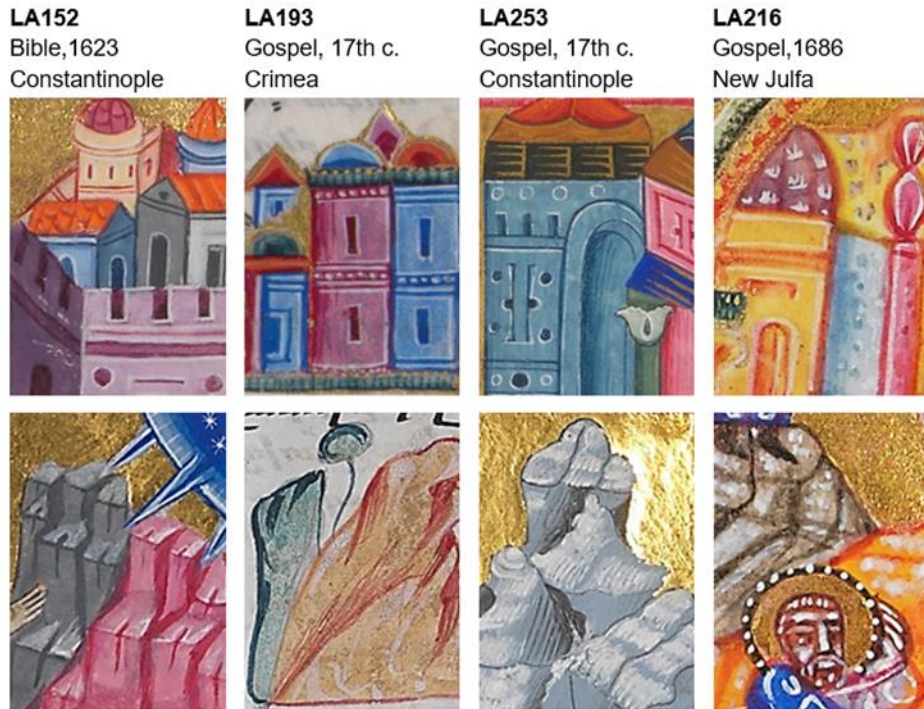


Figure 50. Details of architecture and mountains in the four manuscripts.

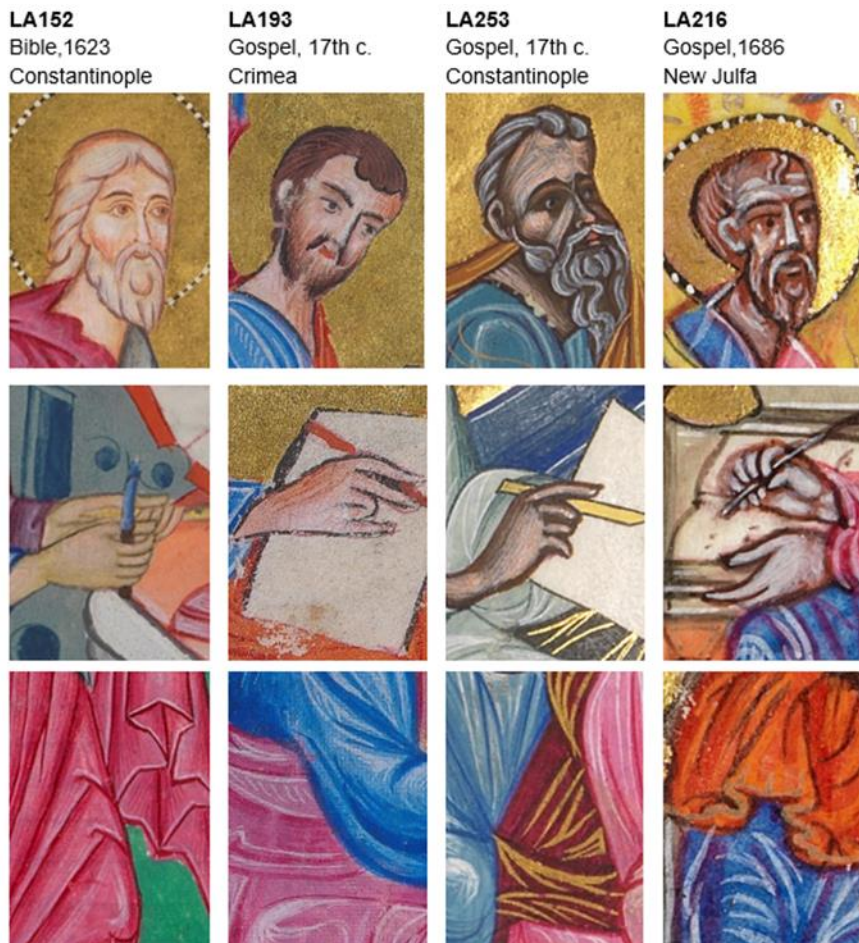


Figure 51. Details of faces, hands and vestments in the four manuscripts.

In LA193, the faces, bodies, and hair are drawn with smooth black lines and delicate forms, as shown in Figure 51 and Appendix G (Sections 4.1 and 5). Sometimes, the pale red drawing lines are visible beneath the black lines. Hairs and beards are painted brown or grey. Flesh tones are likely constructed on a white or pale pink ground layer and modeled with red and white brushstrokes. Cheeks, foreheads, and necks are highlighted with red, animating the figures. In a few instances, mouths are marked with a single red brushstroke. Hands and feet are highlighted with some red. In terms of flesh tones, this manuscript resembles LA152.

To generalize, the flesh tones are light in Bible LA152 and Gospel LA193, primarily based on pinkish hues, while they are dark in Gospels LA253 and LA216, primarily based on brownish hues. Some creative details implemented by the artists give extraordinary expressivity to the figures. Drawings in the Bible LA152 are relatively static and well-defined, with clear lines and very smooth color transitions on painted areas, so the brushstrokes are almost untraceable. Gospel LA193 seeks to follow medieval mastery in the execution of the forms and color choices, such as with MS 7651 (Cilicia, 13–14th centuries) from the Matenadaran collection. Here, refined brushstrokes render the color manipulations and slender gestures, particularly of the hands. Gospel LA253 is an illustrious claim to classical forms closely interrelated with Byzantine art, particularly in portraying the Evangelists, and is the unequivocal result of a medieval prototype such as MS 2629 (Cilicia, 13th century) from the Matenadaran collection. Gospel LA216, the small book, represents a unique artistic hand that gives an impression of spontaneous yet very ingenious solutions. The voluminous brushstrokes in modeling the figures and faces create a powerful visual effect. The artist seeks novel inspirations that probably originate from Western schools. Although there are some similarities in the rendering of the ornaments, these manuscripts have entirely different methods to figure constructions and flesh tones that will be interesting to explore further. The diversity of Armenian miniature schools could contribute to the dating of manuscripts.

Among the four manuscripts, we highlight the elegance of the painting on the Bible LA152, which reflects the vision of its master, who knew how to combine techniques from the West and the East and could count on a prosperous commissioner interested in praising Armenian art and culture by recreating a golden era through illuminated manuscripts.

5.3.1. Materials and Methods

5.3.1.1. Points of Analysis for the Four Manuscripts

The areas of analysis by Portable Raman, FORS, and XRF are described in Appendix H. Our methodology involves analyzing at least three points by XRF and FORS per color hue (e.g., light blue, dark blue). This analysis will allow us to select the best areas to analyze via Raman, with at least one point per color. The folia were selected according to their interest

and to have the widest range of colors possible, representative of the manuscript. This was the case for the analysis done in LA152 (pp. 13, 14, 588, 631, 795, and 796), LA193 (pp. 32, 160, and 168), LA216 (ff. 4r, 11v, and 141v), and LA253 (ff. 5v, 9r, 12v, 19v, and 28v). After this screening, it was necessary to understand if the characterization of some colors was consistent throughout the manuscript (e.g., the anthraquinone pinks and reds). Therefore, more punctual analyses were done using the technique best suited, in LA152 (pp 15, 509, and 1210), LA193 (pp. 5, 12, 33, 97, 98, 134, and 171), LA216 (ff. 22v, 23v, 145r, 213v, and 217r), and LA253 (ff. 91v, and 277v).

5.3.1.2. Preparation of Historic Paint and Ink Reconstructions

The paint references used to compare and identify the colorants were produced with the following materials: Vermilion (May & Baker LTD Dageham England), malachite and orpiment (Kremer), Azurite (Zecchi), and reagent grade chemicals such as indigo and calcium carbonate (Aldrich), minium (Panreac). Lead white was prepared in our laboratory following the medieval process. Gallnuts (from *Quercus infectoria*) and gum arabic in grains from *A. senegal* were purchased from Kremer, and the last was prepared in a 20% solution in Millipore water.

The paint references were then made using 84% of gum arabic to 16% of pigment in weight and applied with an n°2 brush tool in circles of 2 cm² on parchment. The iron-gall ink reference was made following a 15th-century recipe found in the Archivo Histórico Provincial de Córdoba, Sección de Protocolos Notariales de Córdoba. The recipe is described elsewhere [54]. The paint was applied with a micropipette (60 µL) in squares of 2 cm² on filter paper.

5.3.1.3. Fiber-Optics Reflectance Spectroscopy

UV-VIS reflectance spectra were obtained with an Ocean Optics, MAYA 2000 Pro reflectance spectrophotometer equipped with single beam optical fibers and a Hamamatsu linear silicon CCD detector collecting spectra in a 200–1060 nm spectral range. The light source was an Ocean Optics HL-2000-HP halogen lamp, with 20-W output and 360–2400 nm spectral range. Analysis was conducted with an 8-ms integration time, 15 scans, eight box width, and a 45°/45° reflection angle to the bearing surface, with a 2-mm spatial resolution. A Spectralon[®] white reference was used for calibration. While being acquired from 350 to 800 nm in reflectance, the spectra are shown as apparent absorbance, $A' = \log_{10} (1/R)$.

5.3.1.4. Portable Raman Spectroscopy

Handheld Raman spectroscopy was carried out with a Raman Mira DS, equipped with a laser emitting light at 785 nm with a maximum power of 100 mW, within a spectral range of 200–2300 nm. This equipment provides a spectral resolution of 8–10 cm^{-1} and features a measuring spot of 0.042–2.5 mm. The detection technique used goes under the name of Orbital Raster Scan (ORS) and involves averaging the signal collected from relatively large sample areas while maintaining the desired resolution. All spectra were acquired with the maximum laser power and averages, varying the integration time according to the target material and working distance (the higher the distance, the higher the acquisition time). A minimum of three spectra were collected from the same sample to ensure reproducibility.

5.3.1.5. Portable Energy Dispersive X-ray Spectrometry

An energy dispersive X-ray spectrometry (XRF) analysis of the manuscripts was undertaken using a portable setup equipped with the Mini-X X-ray generator and the 123 SDD detector from Amptek[®]. The X-ray generator has an Rh anode. The outgoing radiation is collimated by a 1 mm diameter hole brass collimator with an aluminum insert. The silicon drift detector (SDD) has a 25 mm² detection area, a 500 mm thickness, and a 12.5 μm Be window. The detector energy resolution is 130 keV at 5.9 keV. The angle between the incident and the emitted X-ray beam is 90°, allowing for a high background reduction due to Compton scattering. The 4 mm distance between the spectrometer and the manuscript was controlled by a millimeter screw.

The manuscripts were analyzed on air at room temperature. Spectra were acquired at 40 kV and 30 μA for 120 s using DppPMCA digital acquisition software from Amptek[®]. The deconvolution of X-ray spectra for peak location and peak area determination was performed using WinAxil (Analysis of X-rays by Iterative Least squares) from Canberra[®].

5.4.1. Conclusions

In this work, we explored the materiality of a group of illuminated manuscripts produced in the last *scriptoria* of the Armenian diaspora, housed in the Gulbenkian Museum, and shown in Figures 34–37. It revealed a rich color palette behind the exquisite art of their unique illuminations. FORS and Raman spectroscopies allowed for the identification of the colorants present in the paints. We stress the use of lapis lazuli and the reds-pinks-purple based on carminic acid obtained from a scale insect, together with orpiment, as shown in Figure 38. The writing inks are based on iron gall inks. The color palette of pure and mixed

pigments indicates the taste and preference of the 17th-century Armenian merchant communities and the availability of certain materials likely circulating between Constantinople, Isfahan/New Julfa, and Crimea, as shown in Figure 33. At the same time, this palette indicates the continuity of medieval traditions in the early modern scriptorial practices through the use of medieval colorants in the illuminations such as lapis lazuli, vermilion, minium, orpiment, organic reds, mixtures of blue with yellows, and organic reds to create greens and purples, lead white, carbon black, and gold.

The illuminations and the painting technique are also discussed. Despite sharing common pigments, however, the mode of application is different for each of the four manuscripts, especially when comparing the paint layers and drawing outlines for figures and faces. Both the materials and the techniques implemented in these codices attest that the manuscript art of the Armenian diaspora remains deeply traditional, regardless of new inspirations. These manuscripts manifest the tribute of the 17th-century Armenian *scriptoria* to the once glorious medieval art. At the same time, they represent quite individual approaches to artistic creativity.

As this article is devoted primarily to the color palette and painting techniques, we briefly discuss each manuscript's art, history, and codicology. These are based on previous [2,3] and current studies (the art historical study dedicated to three Armenian Gospel Books from the Gulbenkian collection is in preparation as a forthcoming publication).

This research will be continued in order to disclose the complete paint formulations and better understand the nature of anthraquinone-dye compositions. The use of red lead (minium) will also have to be studied further. Moreover, this study is essential in Armenian manuscripts and will pave the way for more comprehensive discussions.

Additional material can be found in:

Appendix G. Painting Technique

Appendix H. Areas of Analysis

Appendix J. FORS and Raman Supplementary Data

Supplementary Materials 1&2:

Table S1. Pigments identified in Armenian manuscripts

Table S2. Pigment mixtures identified in Armenian manuscripts

5.5.1. References

- [1] Gulbenkian Archives (Fundação Calouste Gulbenkian, Arquivos Gulbenkian), Lisbon, doc. no. MCG 01470, MCG 02129, MCG 02085, personal consultation, October 2019.
- [2] Grigoryan, H., Melo, M. J., Miranda, A., Rodrigues, J. (2020). The Gulbenkian Bible (17th c.): an interdisciplinary study of a precious Armenian heritage. In: Art of the Armenian Diaspora (World Art Studies), W. Deluga (ed.), Polish Institute of World Art Studies & Tako Publishing House, Warsaw-Toru , Vol. 20, p. 59-75.
- [3] Grigoryan, H. (2022). C'owc'ak Lisaboni Kiwlpênkean t'angarani hayerên jeřagreri [Catalogue of the Armenian manuscripts from the Gulbenkian Museum of Lisbon]. Banber Matenadarani, 34, p. 350-376.
- [4] Kouymjian, D. (1994). From Disintegration to Reintegration: Armenians at the Start of the Modern Era, XVIth-XVIIth Centuries. *Revue du Monde Arménien* 1, p. 9-18.
- [5] Chookaszian, Levon. (2021). The Book Illumination of the Cilician Armenian Kingdom and the Artistic Legacy of Toros Roslin (13th century) between Byzantine and Crusader's Art. In: Erforschen-Erkennen-Weitergeben, H. Buschhausen, J, Prolovi , (eds.), Verlag ratio-books, Lohmar, p. 221.
- [6] Merian, S. L. (2018). Armenian *Scriptoria* in Constantinople. In: Armenia: Art, Religion, and Trade in the Middle Ages. H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 235, 238-240.
- [7] Merian, S. L. (2018). Armenian *Scriptoria* in New Julfa. In: Armenia: Art, Religion, and Trade in the Middle Ages. H. C. Evans (ed.), The Metropolitan Museum of Art, New York, p. 272.
- [8] Der Nersessian, S. (1977). *L'Art Arménien*. Arts et Metiers Graphiques, Paris, p. 233.
- [9] Der Nersessian, S., Mekhitarian, A. (1986). Armenian Miniatures from Isfahan. Armenian Catholicosate of Cilicia and Les Editeurs d'Art Associés, Brussels, p. 131.
- [10] Kouymjian, D. (2011). Armenian Medieval Illumination. In: Armenia: Imprints of a Civilization, G. Uluhogian, B. L. Zekiyanyan, V. Karapetian (eds.), Skira, Milan, p. 97.
- [11] Grigoryan, H., Sahakyan, A., Melo, M. J. (2023). Vordan Karmir: An attempt to unravel the mystery of Armenian cochineal recipes for paints and inks used in manuscripts. In: Dyes in History and Archaeology, J. Kirby (ed.), Archetype, London, Vol. 37/40, p. 190-201, in press.
- [12] Melo, M. J., Nabais, P., Araújo, R., Vitorino, T. (2019). The conservation of medieval manuscript illuminations: a chemical perspective. *Phys. Sci. Rev.*, 20180017. DOI: 10.1515/psr-2018-0017
- [13] Melo, M. J., Nabais, P., Vieira, M., Araújo, R., Otero, V., Lopes, J., Martín, L. (2022). Between past and future: advanced studies of ancient colors to safeguard cultural heritage and new sustainable applications. *Dyes Pigm.*, 208, 110815. DOI: 10.1016/j.dyepig.2022.110815

- [14] Melo, M. J., Castro R., Nabais, P., Vitorino, T. (2018). The book on how to make all the color paints for illuminating books: unraveling a Portuguese Hebrew illuminators' manual. *Herit. Sci.*, 6, p. 1-8. DOI: 10.1186/s40494-018-0208-z
- [15] Nabais, P., Melo, M. J., Lopes, J., Vieira, M., Castro R., Romani, A. (2021). Organic colorants based on lac dye and brazilwood as markers for a chronology and geography of medieval *scriptoria* and workshops: a chemometrics approach. *Herit. Sci.*, p. 9, 1-18. DOI: 10.1186/s40494-021-00490-8
- [16] Orna, M. V., Mathews, Th. F. (1981). Pigment Analysis of the Glajor Gospel Book of U.C.L.A. *Stud. Conserv.*, 26:2, p. 57-72. DOI: 10.1179/sic.1981.26.2.57
- [17] Cabelli, D., Mathews, Th. F. (1982). The Palette of Khatchatur of Khizan. *Journal of the Walters Art Gallery*, 40, p. 37-40.
- [18] Cabelli, D., Orna, M. V., Mathews, Th. F. (1984). Analysis of Medieval Pigments from Cilician Armenia. *Archaeological Chemistry-III*, Chapter 12, p. 243-254. DOI: 10.1021/ba-1984-0205.ch012
- [19] Orna, M. V., Mathews, Th. F. (1988). Uncovering the Secrets of Medieval Artists. *Anal. Chem.*, 60:1, p. 47A-56A. DOI: 10.1021/ac00152a744
- [20] Merian, S. L., Mathews, Th. F., Orna, M. V. (1994). The Making of an Armenian Manuscript. In: *Treasures in Heaven: Armenian Illuminated Manuscripts*, Th. F. Mathews, R. S. Wieck (eds.), The Pierpont Morgan Library and Princeton University Press, New York and Princeton, p. 124-142.
- [21] Keheyan, Y., Eliazian, G., Engel, P., Rittmeier, B. (2009). Py/GC/MS characterization of naturally and artificially aged inks and papers. *J. Anal. Appl. Pyrolysis*, 86, p. 192-99. DOI: 10.1016/j.jaap.2009.06.004
- [22] Baraldi, P., Keheyan, Y. (2016). Characterization of pigments of some Armenian illuminated manuscripts by Raman microscopy. *El. J. Nat. Sci. (Chemical Physics)*, 2:27, p. 8-12.
- [23] Keheyan, Y., Baraldi, P., Eliazian, G., Cesaro, S. N., Ferro, D. (2016a). History and chemical characterization of a fourteenth-century Armenian illuminated Gospel from the Aghtamar island. *Chemical Journal of Armenia*, 69:3, p. 208-225.
- [24] Keheyan, Y., Baraldi, P., Agostino, A., Fenoglio, G., Aceto, M. (2016b). Spectroscopic study of an Armenian manuscript from Biblioteca Universitaria di Bologna. *Eur. J. Sci. Theol.*, 12:3, p. 189-201.
- [25] Keheyan, Y., Aceto, M., Cala, E., Gulmini, M., Idone, A. (2018). Characterization of colorants on a 15th-century Armenian manuscript by means of different spectroscopic techniques. *e-Preservation science*, 15, p. 1-8.
- [26] Eliazian, G., Keheyan, Y., Ajvazyan, A., Petrosyan, A. (2021). The conservation and restoration of the Tsughrut Gospel. In: *Care and conservation of manuscripts*, M. J. Driscoll (ed.), Museum Tusulanum Press, Copenhagen, 17, p. 233-243.

- [27] Brostoff, L. B., Khan, Y. R., Ohanyan, T., Hengemihle, F. (2010). Technical study of a fifteenth-century Armenian illuminated Gospel from the Verin Noravank Monastery. *Stud. Conserv.*, 55:sup2, p. 62-68. DOI: 10.1179/sic.2010.55.Supplement-2.62
- [28] Rabin, I., Binetti, M. (2014). NIR Reflectography reveals ink type: pilot study of 12 Armenian MSS of the Staatsbibliothek zu Berlin. *Banber Matenadarani*, 21, p. 465-470.
- [29] Maybury, I. J., Howell, D., Terras, M., Viles, H. (2018). Comparing the effectiveness of hyperspectral imaging and Raman spectroscopy: a case study on Armenian manuscripts. *Herit. Sci.*, 6, p. 1-15. DOI: 10.1186/s40494-018-0206-1
- [30] Vichi, A., Eliazyan, G., Kazarian, S. G. (2018). Study of the Degradation and Conservation of Historical Leather Book Covers with Macro Attenuated Total Reflection Fourier Transform Infrared Spectroscopic Imaging. *ACS Omega*, 3, p. 7150-7157. DOI: 10.1021/acsomega.8b00773
- [31] Melo, M. J., Castro, R., Miranda, A. (2014). Color in Medieval Portuguese Manuscripts: between Beauty and Meaning. In: *Science and Art: the painted surface*; A. Sgamellotti, B. G. Brunetti, C. Miliani (eds.), Royal Society of Chemistry, Cambridge, p. 170-92.
- [32] Brussatin, M. (1983). *Storia dei colori*. Giulio Einaudi, Torino.
- [33] Gage, J. (2006). *Color in Art*. Thames & Hudson, London.
- [34] Pastoureau, M. (2000). *Bleu. Histoire d'une couleur*. Éditions du Seuil: Paris.
- [35] Kristol, A. M. (1978). *COLOR. Les langues romanes devant le phénomène de la couleur*, Éditions Francke Berne, Zürich.
- [36] Orna, M. V. (2022). *March of the Pigments: Color History, Science and Impact*. Chapter 8, Royal Society of Chemistry, London.
- [37] Coupry C. (2011). À la recherche des pigments. *Revista de História da Arte, FCSH-UNL*, N°1, Série W, 127-136. <https://revistadehistoriadaarte.files.wordpress.com/2011/09/art09.pdf>
- [38] Doherty, B., Daveri, A., Clementi, C., Romani, A., Bioletti, S., Brunetti, B., Sgamellotti, A., Miliani, C. (2013). The Book of Kells: A Non-Invasive MOLAB Investigation by Complementary Spectroscopic Techniques. *Spectrochim. Acta, Part A*, 115, p. 330-336. DOI: 10.1016/j.saa.2013.06.020
- [39] Miguel, C., Claro, A., Gonçalves, A. P., Muralha, S. F. V., Melo, M. J. (2009). A study on red lead degradation in the medieval manuscript *Lorvão Apocalypse* (1189). *J. Raman Spectrosc.*, 40, p. 1966-1973. DOI: 10.1002/jrs.2350
- [40] Roger; P., Villela-Petit, I., Vandroy, S. (2003). Les laques de brésil dans l'enluminure médiévale: reconstitution à partir de recettes anciennes. *Stud. Conserv.*, 48, p. 155-170. DOI: 10.1179/sic.2003.48.3.155
- [41] Castro, R., Pozzi, F., Leona, M., Melo, M. J. (2014). Combining SERS and microspectrofluorimetry with historically accurate reconstructions for the characterization of lac dye paints in medieval manuscript illuminations. *J. Raman Spectrosc.*, 45, p. 1172-1179. DOI: 10.1002/jrs.4608

- [42] Gilbert, B., Denoël, S., Weber, G., Allart, D. (2003). Analysis of Green Copper Pigments in Illuminated Manuscripts by Micro-Raman Spectroscopy. *Analyst*, 128:10, p. 1213-1217.
- [43] Kroustallis, S. (2011). Quomodo decoretur pictura librorum: Materiales y Técnicas de la Iluminación Medieval. In: *Anuario de Estudios Medievales*, 41:2, p. 775-802. DOI: 10.3989/aem.v41.i2.371
- [44] Clarke, M. (2011). *Mediaeval Painters' Materials and Techniques: the Montpellier Liber diversarum arcium*. Archetype, London.
- [45] Brunello, F. (transl.) (1992). *De arte illuminandi e altri trattati sulla tecnica della miniatura medievale*. 1975, Reprint, Neri Pozza Editore, Vicenza.
- [46] Moura, L., Melo, M. J., Casanova, C., Claro, A. (2007). A Study on Portuguese Manuscript Illumination: The Charter of Vila Flor (Flower Town), 1512. *J. Cult. Herit.*, 8, p. 299-306. DOI: 10.1016/j.culher.2007.02.003
- [47] Vieira, M., Nabais, P., Hidalgo, R. J. D., Pozzi, P., Melo, M. J. (2023). The only surviving Medieval codex of Galician-Portuguese secular poetry: tracing history through luxury pink colors. *Herit. Sci.*, 11, p. 1-21.
- [48] Aceto, M., Agostino, A., Fenoglio, G., Idone, A., Gulimini, M., Picollo, M., Ricciardi, P., Delaney, J. K. (2014). Characterization of colorants on illuminated manuscripts by portable fiber optic UV-visible-NIR reflectance spectrophotometry. *Anal. Methods*, 6:5. DOI: 10.1039/C3AY41904E
- [49] Melo, M. J., Araújo, R., Castro, R., Casanova, C. (2016). Color degradation in medieval manuscripts. *Microchem. J. (TECHNART 2015 Virtual Special Issue)*, 124, p. 837-844. DOI: 10.1016/j.microc.2015.10.014
- [50] Pozzi, F., Poldi, G., Bruni, S., De Luca, E., Guglielmi, V. (2012). Multi-technique characterization of dyes in ancient Kaitag textiles from Caucasus. *Archaeol. Anthropol. Sci.*, 4, p. 185-197. DOI: 10.1007/s12520-012-0092-5
- [51] MS Arménien 186, Bibliothèque Nationale de France. Ed. Tchobanian, A. Vasnaghshashi. *Anahit* 1911, 12, p. 130–132. (In Armenian).
- [52] MS Arménien 186, Bibliothèque Nationale de France. Transl. Macler, F. *Documents d'Art Arméniens; Librairie Orientaliste Paul Geuthner: Paris, France, 1924*, p. 13–16.
- [53] Melo, M. J., Otero, V., Vitorino, T., Araújo, R., Muralha, V. S. F., Lemos, A., Picollo, M. (2014). A Spectroscopic Study of Brazilwood Paints in Medieval Books of Hours. *App Spec.*, 68, p. 434-444.
- [54] Hidalgo, R. J. D., Córdoba R., Nabais, P., Valéria, S., Melo, M. J., Pina, F., Teixeira, N., Freitas, V. (2018). New insights into iron-gall inks through the use of historically accurate reconstructions. *Herit Sci.*, 6(63). DOI: 10.1186/s40494-018-0228



CHAPTER 6

Detail, bird-ornament, LA 253, f. 258v

6. CONCLUSIONS AND FUTURE CONSIDERATIONS

6.1. Conclusions

This doctoral dissertation aimed at studying a collection of Armenian illuminated manuscripts, preserved in the Gulbenkian Museum, in Lisbon, by implementation of an interdisciplinary approach. A holistic study of the material encompassed several disciplines such as art history and technology, philology, biology and botany, chemistry, and conservation science. A teamwork of several specialists produced a model study that brings a novelty in the field of Armenian manuscript studies, and Armenian cultural heritage in general. Such studies are essential for the unequivocal assessment of heritage objects and better strategies addressed to their conservation and restoration.

The three methodological divisions of the study included Art history, Art technology, and Art chemistry. The manuscripts were first observed visually and the possible information regarding their history was obtained through textual evidence preserved in the colophons of the manuscripts, on archival documents related to their acquisition, and on related bibliography. Manuscripts were codicologically described and cataloged.

The art of the Armenian manuscripts of Gulbenkian was explored through extensive comparative studies within local Armenian and global European manuscript cultures, revealing the extraordinary iconographical features and artistic mastery of each manuscript (Chapter 3). The art of a Bible manuscript (LA 152) particularly required a complex examination that was sustained continuously during this study. Some new insights regarding its art and history, not revealed yet in this dissertation, will be communicated in the future.

Concerning the materials and techniques of our study material, particular attention was focused on organic reds used as pigments and inks in Armenian illuminations and texts (Chapter 4). The study aimed at reaffirming the use of Armenian cochineal (*Porphyrophora hamelii*) within the formulations of organic pigments ranging between pinks, carmines, and purples, that are still brilliantly preserved in precious illuminations. The efforts to recover the old texts with practical instructions on how to prepare the Armenian cochineal (*vordan karmir*) gave worthy results. The historical recipe texts were retrieved from original manuscripts and an attempt was made to rationalize their content. Additionally, the ingredients mentioned in these historical cochineal recipes, including the Armenian cochineal, were collected, and employed in the practical stage of recipe reconstructions. The historical recipes were reconstructed using the species of American (*D. coccus*) and Armenian (*P. hamelii*) cochineals. However, the complexity of these recipes and the Armenian cochineal itself require more research. Therefore, this part of the dissertation is a work in progress. The

viability of these reconstructions will be assessed, and followed by a chemical examination at the molecular level. A database of historically accurate reconstructions of Armenian cochineal pigment recipes will be constructed.

The first technical examination of study material was carried out by the implementation of microscopic and spectroscopic techniques, addressed to elemental and molecular characterization of the palette of the manuscripts, and the assessment of painting techniques and conservation state of the paints and inks. The portable Fiber-Optic Microscope, FORS, μ Raman, and μ EDXRF allowed the in-situ screening of the manuscripts. A few micro-samples, invisible to the naked eye, were collected for further study. This was done for in-depth and complete characterization of some paint formulations, mostly of organic composition, that was not possible to accomplish without a sampling procedure and further manipulation of the collected micro-samples. This is a work in progress as well.

Obtained information on the color palette of Armenian manuscripts of the Gulbenkian collection indicated the use of the most appreciated pigments, implemented already in medieval Armenian *scriptoria*. The blues were mostly based on lapis lazuli, inorganic reds on vermilion, and organic reds on animal-derived sources. Yellows were based on orpiment, greens were mainly mixtures of blue and yellow, whites were lead white, and blacks were carbon-based. This preliminary insight is yet to be furtherly developed. The study aims at obtaining the results for the collected micro-samples, which will allow us to interpret the complete paint formulations, including the binders, and to understand the chemical nature of some organic compositions present as carmine and yellow paints in manuscripts under the study.

In conclusion, this study provides novel approaches and intriguing results, yet leaving undisclosed questions to be answered. Its implementation has been carried out by diligent teamwork, and achieved thanks to the inspiration of the precious art of the Armenian illuminated manuscripts.

6.2. Future Considerations

During all these years, while this dissertation was being implemented, and its vague silhouettes were gradually getting their solid forms, several thoughts came across the mind of the author, that she would like to share here as future considerations.

While working in each of the three main divisions of this study, Art history, Art technology, and Art chemistry, I met several lacunae that potentially can be converted into interesting studies. I assume that this coherent process, when new questions arise while old ones are answered, is the very nature of research.

One of my thoughts emerged from the very first study of the Gulbenkian Bible (LA 152). This manuscript offers much more insights to be explored than is presented in this dissertation. For instance, a separate study can be dedicated to the group of Armenian Bibles produced during the seventeenth century that share common imagery. It will be interesting to investigate the origin of some unique images present in these Bibles in a much deeper way: to make a larger comparative study in the local and global context of Bible manuscripts, to precisely identify the model books circulated between *scriptoria*, to understand the social and cultural choices for such artistic manifestations, and to establish the clusters within these Bible manuscripts, based on similar pictorial patterns.

The intriguing past of this sumptuous Bible may result in the recreation of its biography, by tracing back its trajectories from Lisbon to Constantinople, alluding that this manuscript somehow found its home out of home. Ironically rather than intentionally, this Bible was owned by two richest Armenians of their time, Xoġa Nazar and Calouste Gulbenkian. Bible was 'born' in Constantinople in 1623 and was acquired by Gulbenkian who was born in Constantinople in 1926, some 300 years apart. “Դարձ ի շրջանս իւր” [darj i šrġans iwɾ], an Armenian idiom would say, which means “return to its origin”. We think that the fascinating narrative of this Bible deserves more attention. The creators of LA 152 and their environment deserve reflections as well that can be addressed to the exploration of the scriptorial legacy of a diligent scribe Hakob and the history of the church of St. Nikolayos in Constantinople, where the Bible was executed. This may add invaluable insights to the present study.

Moving towards the historical reconstructions of cochineal recipes, I came up with more considerations. First, is that in Armenian scholarship the historical written sources related to artistic techniques and practical knowledge on how to prepare the paints and inks are rarely studied. Unlike the European tradition, where several medieval painting treatises and recipe books are known, the Armenian practice is rather discreet. However, if to look carefully, this literature exists. It needs to be revealed, studied, and practiced to revive the knowledge of our ancients. A systematic study of medieval to early modern Armenian sources that contain recipes and instructions may help to reconstruct the vivid palette of Armenian manuscripts, and to employ it in conservation or restoration treatments, maintaining the original state of the precious manuscripts for as long as possible. Additionally, I do believe, that Armenian practice may suggest some unique patterns, not found in other cultures, as was the case with Armenian cochineal recipes, discussed in this dissertation.

Hence, emerges the second consideration for this part of the work, related to Armenian cochineal, the most praised red dye in Armenian cultural memory. Our study of Armenian cochineal recipes for preparing the inks and pigments to be used in illuminated manuscripts provided us with significant background in this field. However, the whimsy *Porphyrophora* still has many secrets to reveal. The nature of the Armenian cochineal, however, is different from its American counterparts, which marks the difference in the resulting pigments. Thus, it needs to be better studied. Regarding Armenian cochineal recipes, I think that their

chronology and provenance require a more detailed study, perhaps in a larger comparative context. Apart from written sources, I think it would be extremely important to try to recover the folk tradition or oral history of Armenian *vordan*, although it becomes more difficult with time passing by. However, as cochineal has a special place in the Armenian worldview, I do believe that an important part of popular knowledge can still be retrieved, especially in the villages that are close to the former sites of Armenian cochineal propagation.

Finally, during the material analysis of Gulbenkian manuscripts, I came across one more consideration. The colors and techniques of manuscript illuminations are especially delightful when observed under the microscope. The most complex and diverse approaches, however, were observed in the constructions of flesh tones, that is for painting of the faces and figures. It was usually done by combination of several layers, colors, and techniques, to render an impressive expressiveness and animation of figurative images. Unfortunately, I observed disintegration and discoloration of especially the flesh tones in many manuscripts, while dealing with iconography. Most of these color changes are visible even to the naked eye. It would be both interesting and important to dedicate a study to flesh tones in Armenian manuscripts, probably, narrowing the scope of the manuscripts to some extent. Using the technical and visual examination the study may reveal a wealth of information regarding the painting techniques (construction and modeling of the faces and figures by layering, mixing, or other ways of application of the pigments), the composition of used paints, and the degradation phenomena of flesh tones. This will help also to establish the practices used in certain *scriptoria* or by single artists. It will contribute to the conservation of manuscript illuminations, safeguarding the integrity of the “manuscript faces”.



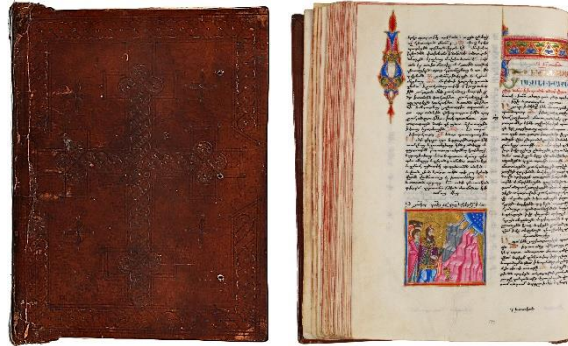
Detail, marginal ornament, LA 193, p. 233

Appendix A

(Chapter 2)

Physical Description of the Manuscripts

BIBLE LA 152



Current data

Inv. no.	LA 152
Name	Bible
Category	Illuminated manuscript
Institution	Museu Calouste Gulbenkian
Place	Lisbon, Portugal

Historical data

Period	Early modern
Culture	Armenia
Language	Armenian
Provenance	Constantinople
Date	1623
Scribe	Hakob, Step'anos (?)
Artist	Hakob (?)
Commissioner	Xoĵa Nazar
Colophon	pp. 1-6, 1208-1211
Annotations	pp. 87, 137, 295, 462, 942, 1032, 1112, 1208, 1211-1212

Content

Typology	Religious, Bible
Subject	Old and New Testaments
Condition	Complete
Incipit	Գլուխք ծնընդոցն...
Explicit	...և շնորհք անդրանիկին սիրելոյ: Ամէն:

Illustrations

Typology	Narrative and symbolic
Full-page miniatures	Creation (13); Revelation, title-page (14); Evangelist Mark and title-page (981-982); Title-pages (610, 662, 950, 1002, 1036)
Miniatures in one of the text columns	Narrative (137, 167, 241, 477, 487); Portrait (736, 819, 877, 897, 1065, 1095, 1099, 1113, 1139)
Ornated headpieces	Almost in all the folios, at the beginning of the book chapters
Ornated incipit letters	Almost in all the folios, at the beginning of the book chapters
Ornated marginalia	Almost in all the folios, indicating the beginning of the chapters

Physical description

General

Format	Codex
Dimensions	224 x 165 mm
Folios	606 ¹
Foliation	Modern numerical pagination in pencil: 1-1212
Endleaves	2 (left) + 4 (right)
Quires	52 (mostly of 12 folios)
Signature	Mostly present, marked with Armenian letters at the beginning and the end of each quire, on the lower center margin
Gutter	Sewing and triangular notches (<i>grecquage</i>)
Ruling	Not visible; ruling with a lead point or carbon is mostly visible for vertical lines of text columns
Pricking	Not visible; pricking with a pointed tool mostly visible for vertical lines of text columns

Textblock

Dimensions	164 x 115 mm
Margins	20/40/40/10 mm (top/bottom/outer/inner)
Columns	2
Lines	47
Script	<i>Bolorgir</i> (round minuscule)

¹ Sirarpie Der Nersesian and our first article mention about 609 folios, but our recounts have shown 606 folios corresponding to 1212 pages.

Materials

Support	Parchment
Text	Inks (black, red, blue, gold)
Illuminations	Pigments and dyes (red, blue, green, pink, purple, brown, grey, white, gold)

Binding

Proposed dating	Probably original (17th century)
Cover	Dark brown leather, with stamped decorations
Boards	Wood
Lining	Blue fabric
Other	Remnants of three leather fastenings on the inner face of the right board; red-colored edges

Conservation state

Present condition	Good ²
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Bibliography

Maria Queiroz Ribeiro. *Only the Best: Masterpieces of the Calouste Gulbenkian Museum, Lisbon*, exhibition cat., eds. K. Baetjer, J. D. Draper, The Metropolitan Museum of Art, New York, 1999, pp. 21-22, no. 4.

Vrej Nersessian. *Treasures from the Ark: 1700 Years of Armenian Christian Art*, exhibition cat., The British Library, London, 2001, pp. 188-89, no. 117.

Ina Baghdiantz McCabe. *a) An Armenian King in Exile: New Julfa's Shah through a Persian Edict and an Armenian Bible, Revue des Études Arméniennes* 27, 1998-2000, pp. 321-28; *b) The Armenian Bible of 1623 and the Merchant Communities of Constantinople and New Julfa, Armenian Constantinople*, eds. S. Payaslian, R. G. Hovhannisian, Costa Mesa, 2010, pp. 183-199.

Sylvie L. Merian. *a) Armenian Scriptoria in Constantinople, b) Armenian Scriptoria in New Julfa, Armenia: Art, Religion, and Trade in the Middle Ages*, exhibition cat., ed. H. C. Evans, The Metropolitan Museum of Art, New York, 2018, pp. 235, 272, 238-40, no. 109.

² Degradation issues for Bible LA 152 and Gospels LA 193, LA 216, and LA 253 are detailed in Appendix G.

Jorge Rodrigues, *The Rise of Islamic Art, 1869-1939*, exhibition cat., ed. J. Hallett, Calouste Gulbenkian Foundation, Lisbon, 2019, pp. 117-18.

Hermine Grigoryan, Maria João Melo, Adelaide Miranda, Jorge Rodrigues. The Gulbenkian Bible (17th c.): an interdisciplinary study of a precious Armenian heritage, *Art of the Armenian Diaspora*, ed. W. Deluga (Conferences and Studies of the Polish Institute of World Art Studies, Vol. 20), Warsaw-Torun, 2020, pp. 59-75.

Hermine Grigoryan, Catalogue of the Armenian manuscripts of the Gulbenkian Museum in Lisbon (in Armenian). *Bulletin of Matenadaran* (Banber Matenadaran), 2022, 34, pp. 350-76.

GOSPEL LA 193



Current data

Inv. no.	LA 193
Name	Gospel
Category	Illuminated manuscript
Institution	Museu Calouste Gulbenkian
Place	Lisbon, Portugal

Historical data

Period	Early modern
Culture	Armenia
Language	Armenian
Provenance	Crimea
Date	17th century (1647-1693)
Scribe	Nikolayos
Artist	Nikolayos
Commissioner	Unknown
Colophon	pp. 270-271
Annotations	p. 553

Content

Typology	Religious, Gospel
Subject	Four Gospel Books
Condition	Complete
Incipit	Եւսեբի Կարալիանոսի սիրելի եղբար...
Explicit	...տանել զգիրսըն որ թն գրեալ էին:

Illustrations

Typology	Narrative and symbolic
Full-page miniatures	Canon Tables (4-5, 8-9, 12-13, 16-17, 20-21); Evangelists Matthew, Mark, Luke, John (28, 176, 272, 428); Title-pages (29, 177, 273, 429); Genealogy of Christ in 78 medallions (292-295)
Frieze-like narrative miniatures	In almost all the folios
Ornated incipit letters	In most of the folios, at the beginning of the book chapters
Ornated marginalia	In most of the folios, indicating the beginning of the chapters

Physical description

General

Format	Codex
Dimensions	176 x 133 mm
Folios	277
Foliation	Modern numerical pagination in pencil: 1-554
Endleaves	1 (left) + 1 (right)
Quires	24 (mostly of 12 folios)
Signature	Mostly present, marked with Armenian letters at the beginning and the end of each quire, on the lower center margin
Gutter	Sewing and rectangular notches
Ruling	Not visible; ruling with a lead point or carbon is barely visible for vertical lines of text columns
Pricking	Not visible

Textblock

Dimensions	121 x 83 mm
Margins	20/35/30/20 mm (top/bottom/outer/inner)
Columns	1
Lines	23
Script	<i>Bologir</i> (round minuscule)

Materials

Support	Parchment
Text	Inks (black, red, gold)

Illuminations	Pigments and dyes (red, blue, green, pink, purple, orange, brown, grey, white, gold)
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Binding

Proposed dating	Probably original (17th century)
Cover	Brown leather, with decorated silver plaques on the outer faces of the left and right boards
Boards	Wood
Lining	Parchment attached to the boards
Other	Remnants of two woven fastenings attached to the outer face of the right board

Conservation state

Present condition	Good
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Bibliography

Hermine Grigoryan, Catalogue of the Armenian manuscripts of the Gulbenkian Museum in Lisbon (in Armenian). Bulletin of Matenadaran (Banber Matenadaran), 2022, 34, pp. 350-76.
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GOSPEL LA 216



Current data

Inv. no.	LA 216
Name	Gospel
Category	Illuminated manuscript
Institution	Museu Calouste Gulbenkian
Place	Lisbon, Portugal

Historical data

Period	Early modern
Culture	Armenia
Language	Armenian
Provenance	New Julfa (Isfahan)
Date	1686
Scribe	Gaspar
Artist	Hayrapet
Commissioner	Elsabert'
Colophon	ff. 262v-265v
Annotations	ff. 91v, 141v, 211v, 213v

Content

Typology	Religious, Gospel
Subject	Four Gospel Books
Condition	Complete
Incipit	Եւսեբի Կարպիանոսի սիրելի եղբար...
Explicit	...երթ յայսմ հետև մի մեղանչեր:

Illuminations

Typology	Narrative and symbolic
Full-page miniatures	Canon Tables (1v-2r, 3v-4r, 5v-6r, 7v-8r, 9v-10r); Evangelists Matthew, Mark, Luke, John (11v, 91v, 141v, 213v); Title-pages (12r, 92r, 142r, 214r); Genealogy of Christ in 39 medallions (12v-15v); Tree of Jesse (16r)
Narrative miniatures	In almost all the folios, enclosed in the textblock
Ornated incipit letters	Almost in all the folios, at the beginning of the book chapters
Ornated marginalia	Almost in all the folios, indicating the beginning of the chapters

Physical description

General

Format	Codex
Dimensions	108 x 079 mm
Folios	266
Foliation	Modern numerical foliation in pencil: 1-266
Endleaves	Probably not preserved
Quires	23 (mostly of 12 folios)
Signature	Mostly present, marked with Armenian letters at the beginning and the end of each quire, on the lower center margin
Gutter	Sewing and triangular notches (<i>grecquage</i>)
Ruling	Not visible; ruling with red ink is visible for vertical lines of text columns
Pricking	Not visible; pricking with a pointed tool mostly visible for vertical lines of text columns

Textblock

Dimensions	78 x 49 mm
Margins	10/20/20/10 mm (top/bottom/outer/inner)
Columns	2
Lines	22
Script	<i>Bolorgir</i> (round minuscule)

Materials

Support	Parchment
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Text	Inks (black, red, blue, gold)
Illuminations	Pigments and dyes (red, blue, green, pink, orange, purple, brown, grey, white, gold)

Binding

Proposed dating	Probably original (17th century)
Cover	Brown leather, with a double cover of delicate silverwork
Boards	Wood
Lining	Stamped woven fabric
Other	Fore-edge flap and two clasps of the silver cover; red-colored edges

Conservation state

Present condition	Good
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Bibliography

Hermine Grigoryan, Catalogue of the Armenian manuscripts of the Gulbenkian Museum in Lisbon (in Armenian). <i>Bulletin of Matenadaran</i> (Banber Matenadarani), 2022, 34, pp. 350-76.
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GOSPEL LA 253



Current data

Inv. no.	LA 253
Name	Gospel
Category	Illuminated manuscript
Institution	Museu Calouste Gulbenkian
Place	Lisbon, Portugal

Historical data

Period	Early modern
Culture	Armenia
Language	Armenian
Provenance	Constantinople (tentative attribution)
Date	17th century (tentative attribution)
Scribe	Unknown
Artist	Unknown
Commissioner	Unknown
Colophon	Not preserved
Annotation	f. 2r

Content

Typology	Religious, Gospel
Subject	Four Gospel Books
Condition	Incomplete
Incipit	...ազոյն պատմութիւն... (second Eusebian Canon)
Explicit	...ըովանդակ բնաւիւն ինչ ոչ յաշխարհ... (end of the Gospel of John)

Illuminations

Typology	Narrative and symbolic
Full-page miniatures	Christ cycle: Annunciation, Nativity, Presentation in Temple, Baptism, Resurrection of Lazarus, Entry into Jerusalem, Washing of Feet, Betrayal, Crucifixion, Descent from the Cross, Ascension, Pentecost, Second Coming (5v, 6r, 7v, 8r, 9r, 10v, 11r, 12v, 13r, 14v, 15v, 16r, 17v); Canon Tables (18r, 19v-20r, 21v-22r, 23v-24r, 25v-26r); Evangelists Mathew, Marc, Luke, John (28v, 94v, 143v, 219v); Title-pages (29r, 95r, 144r, 220r)
Ornated incipit letters	Almost in all the folios, at the beginning of the book chapters
Ornated marginalia	Almost in all the folios, indicating the beginning of the chapters
Other	Unfinished drawings of birds with red ink (277v)

Physical description

General

Format	Codex
Dimensions	154 x 114 mm
Folios	280
Foliation	Modern numerical foliation in pencil: 1-280
Endleaves	Probably not preserved
Quires	26 (mostly of 12 folios)
Signature	Mostly present, marked with Armenian letters at the beginning and the end of each quire, on the lower center margin
Gutter	Sewing and triangular notches (<i>grecquage</i>)
Ruling	Visible for horizontal lines, for vertical lines of text columns, and for four narrow lines at the bottom of the folios, where the Eusebian concordance numbers are written, made with a lead point or carbon
Pricking	Not visible; pricking with a pointed tool mostly visible for vertical lines of text columns

Textblock

Dimensions	104 x 84 mm
Margins	15/35/20/10 mm (top/bottom/outer/inner)
Columns	2

Lines	23
Script	<i>Bologir</i> (round minuscule)
Materials	
Support	Parchment
Text	Inks (black, red, blue, gold)
Illuminations	Pigments and dyes (red, blue, green, pink, orange, yellow, purple, brown, grey, white, gold)
Binding	
Proposed dating	Probably original (17th century)
Cover	Brown leather, with stamped decorations
Boards	Wood
Lining	Striped woven fabric
Other	Fore-edge flap, red-colored edges
Conservation state	
Present condition	Good
Bibliography	
Hermine Grigoryan, Catalogue of the Armenian manuscripts of the Gulbenkian Museum of Lisbon (in Armenian). Bulletin of Matenadaran (Banber Matenadaran), 2022, 34, pp. 350-76.	

Appendix B

(Chapter 2)

Content Description of the Manuscripts

BIBLE LA 152

Page	Text	Illustration
1	<i>Annotation</i>	--
2-6	<i>Colophon and brief content of Old and New Testaments written on verses</i>	Rubricated majuscule letters
7	<i>Blank page</i>	--
8-9	Index of Genesis	Ornated headpiece and initial, rubricated majuscule letters
9-10	Prologue of Genesis	--
11-12	<i>Blank pages</i>	--
13	No text	Full-page miniature: scenes of Creation
14	The Book of Genesis: <i>In the beginning...</i>	Illuminated title-page: headpiece with scenes of Revelation, initial and marginalia
15-58	The Book of Genesis	--
59-61	Testaments of the Twelve Patriarchs; Testament of Reuben	Ornated headpiece, initial and marginalia
61-62	Testament of Simeon	Ornated initial and marginalia
62-67	Testament of Levi	Ornated initial and marginalia
67-71	Testament of Judah	Ornated initial and marginalia
71-72	Testament of Issachar	Ornated initial and marginalia
72-74	Testament of Zebulun	Ornated initial and marginalia
74-76	Testament of Dan	Ornated initial and marginalia
76-78	Testament of Naphtali	Ornated initial and marginalia
78-80	Testament of Gad	Ornated initial and marginalia
80-82	Testament of Asher	Ornated initial and marginalia
82-85	Testament of Joseph	Ornated initial and marginalia
85-87	Testament of Benjamin; <i>Annotation (p. 87)</i>	Ornated initial and marginalia
87-91	Index of Exodus	Ornated initial and marginalia, rubricated majuscule letters
92-133	Prologue of Exodus; The Book of Exodus	Ornated headpiece, initial and marginalia
133-136	Index of Leviticus	Ornated initial and marginalia, rubricated majuscule letters
136-137	Prologue of Leviticus	Rubricated letters
137-165	The Book of Leviticus; <i>Annotation (p. 137)</i>	Ornated headpiece, initial and marginalia, in-text miniature

165-167	Index of Numbers	Ornated initial and marginalia, rubricated majuscule letters
167	Prologue of Numbers	Ornated initial and marginalia, in-text miniature
168-204	The Book of Numbers	Ornated headpiece, initial and marginalia
204-207	Index of Deuteronomy	Ornated initial and marginalia, rubricated majuscule letters
207-239	Prologue of Deuteronomy; The Book of Deuteronomy	Ornated headpiece, initial and marginalia
239-241	Index of Joshua	Ornated initial and marginalia, rubricated majuscule letters
241	Prologue of Joshua	Ornated initial and marginalia, in-text miniature
242-265	The Book of Joshua	Ornated headpiece, initial and marginalia
265-266	Index of Judges	Ornated initial and marginalia, rubricated majuscule letters
266	Prologue of Judges	Ornated initial and marginalia
267-289	The Book of Judges	Ornated headpiece, initial and marginalia
289-292	The Book of Ruth	Ornated headpiece, initial and marginalia
292-293	Preamble of Kings	Ornated initial and marginalia
293-295	Index of First Book of Kings	Ornated initial and marginalia, rubricated majuscule letters
295	Prologue of First Book of Kings; <i>Annotation</i>	Ornated initial and marginalia
296-325	The First Book of Kings	Ornated headpiece, initial and marginalia
325-326	Index of Second Book of Kings	Ornated initial and marginalia, rubricated majuscule letters
327-350	The Second Book of Kings	Ornated headpiece, initial and marginalia
350-352	Index of Third Book of Kings	Ornated initial and marginalia, rubricated majuscule letters
352-379	The Third Book of Kings	Ornated headpiece, initial and marginalia
379-381	Index of Forth Book of Kings	Ornated initial and marginalia, rubricated majuscule letters

382-406	The Forth Book of Kings	Ornated headpiece, initial and marginalia
406-407	Index of First Book of Chronicles	Ornated initial and marginalia, rubricated majuscule letters
407	Prologue of First Book of Chronicles	Ornated initial and marginalia
408-431	The First Book of Chronicles	Ornated headpiece, initial and marginalia
431-432	Index of Second Book of Chronicles	Ornated initial and marginalia, rubricated majuscule letters
433-462	The Second Book of Chronicles	Ornated headpiece, initial and marginalia
462	Index of First Book of Ezra; Prologue of First Book of Ezra; <i>Annotation</i>	Ornated initial and marginalia, rubricated majuscule letters
463-477	The First Book of Ezra	Ornated headpiece, initial and marginalia
477	Index of Second Book of Ezra	Ornated initial and marginalia, rubricated majuscule letters, in-text miniature
478-486	The Second Book of Ezra	Ornated headpiece, initial and marginalia
486-487	Index of Book of Nehemiah	Ornated initial and marginalia, rubricated majuscule letters
487-498	Prologue of Book of Nehemiah; The Book of Nehemiah	Ornated headpiece, initial and marginalia, in-text miniature
498-499	Prologue of Book of Esther	Rubricated capital letter
500-508	The Book of Esther	Ornated headpiece, initial and marginalia
509-521	The Book of Judith	Ornated headpiece, initial and marginalia
521	Prologue of Book of Tobit	Ornated initial and marginalia
522-529	The Book of Tobit	Ornated headpiece, initial and marginalia
530-532	Index of First Book of Maccabees	Ornated initial and marginalia, rubricated majuscule letters
532	Prologue of First Book of Maccabees	Ornated initial and marginalia
533-563	The First Book of Maccabees	Ornated headpiece, initial and marginalia
563-564	Index of Second Book of Maccabees	Ornated initial and marginalia, rubricated majuscule letters
564	Prologue of Second Book of Maccabees	Ornated initial and marginalia

565-587	The Second Book of Maccabees	Ornated headpiece, initial and marginalia
587	Index of Third Book of Maccabees	Ornated initial and marginalia, rubricated majuscule letters
588-609	Prologue of Third Book of Maccabees; The Third Book of Maccabees	Ornated headpiece, initial and marginalia
610-661	The Book of Psalms	Illuminated title-page with ornated headpiece, initial, and marginalia <i>(each page of this Book has ornated initial and marginalia, sometimes headpiece)</i>
661	Prologue of Book of Proverbs; Index of Book of Proverbs	Rubricated majuscule letter
662-682	The Book of Proverbs	Illuminated title-page with ornated headpiece, initial, and marginalia
683-685	Prologue of Book of Ecclesiastes; Index of Book of Ecclesiastes	Ornated initial and rubricated majuscule letters
685-691	The Book of Ecclesiastes	Ornated headpiece, initial and marginalia
691-692	Prologue of Song of Songs	Ornated initial
692-696	The Song of Songs	Ornated headpiece, initial and marginalia
696-697	Prologue of Book of Wisdom	Rubricated majuscule letter
697	Index of Book of Wisdom	Rubricated majuscule letters
698-710	The Book of Wisdom	Ornated headpiece, initial and marginalia
710-711	Prologue of Book of Job	Rubricated majuscule letter
712-734	The Book of Job	Ornated headpiece, initial and marginalia
734-735	Prologue of Book of Isaiah; Index of Book of Isaiah	Ornated initial, marginalia, and rubricated capital letters
736-777	The Book of Isaiah	Ornated headpiece, initial and marginalia, in-text miniature
777-778	Prologue of Book of Twelve Profets	Rubricated majuscule letter
778-784	Index of Book of Hosea; The Book of Hosea	Rubricated majuscule letters; Ornated headpiece, initial and marginalia
784-789	Index of Book of Amos; The Book of Amos	Rubricated majuscule letters; Ornated headpiece, initial and marginalia

789-792	Index of Book of Micah; The Book of Micah	Rubricated majuscule letters; Ornated headpiece, initial and marginalia
792-793	Index of Book of Joel	Rubricated majuscule letters
793-795	The Book of Joel	Ornated headpiece, initial and marginalia
795-796	Index of Book of Obadiah; The Book of Obadiah	Ornated headpiece, initial and marginalia
796-797	Index of Book of Jonah; The Book of Jonah	Ornated headpiece, initial and marginalia
797-799	Index of Book of Nahum; The Book of Nahum	Rubricated majuscule letter; Ornated headpiece, initial and marginalia
799-800	Index of Book of Habakkuk; The Book of Habakkuk	Rubricated majuscule letter; Ornated headpiece, initial and marginalia
800	Index of Book of Zephaniah	Rubricated majuscule letter
801-802	The Book of Zephaniah	Ornated headpiece, initial and marginalia
802-804	Index of Book of Haggai; The Book of Haggai	Rubricated majuscule letter; Ornated headpiece, initial and marginalia
804-811	Index of Book of Zechariah; The Book of Zechariah	Rubricated majuscule letter; Ornated headpiece, initial and marginalia
811-813	Index of Book of Malachi; The Book of Malachi	Rubricated majuscule letter; Ornated headpiece, initial and marginalia
813-815	Death of Twelve Profets	Rubricated majuscule letters
815-816	Prologue of Book of Jeremiah	Rubricated majuscule letter
816-818	Index of Book of Jeremiah	Rubricated majuscule letters
819-871	The Book of Jeremiah	Ornated headpiece, initial and marginalia, in-text miniature
871-875	Lamentation of Jeremiah	Rubricated majuscule letter
876-877	Prologue of Book of Daniel; Index of Book of Daniel	Rubricated majuscule letters
877-894	The Book of Daniel	Ornated headpiece, initial and marginalia, in-text miniature
894-895	Prologue of Book of Ezekiel	Rubricated majuscule letter
895-897	Index of Book of Ezekiel	Rubricated majuscule letters

897-942	The Book of Ezekiel; <i>Annotation (p. 942)</i>	Ornated headpiece, initial and marginalia, in-text miniature
943	The Letter of Eusebius	Ornated headband, rubricated majuscule letters
944-947	Canon Tables	Ornated headbands, tables
948-949	Index of Gospel of Matthew; Prologue of Gospel of Matthew	Rubricated majuscule letters
950-979	The Gospel of Matthew	Illuminated title-page with ornated headpiece, initial, and marginalia <i>(each page of this Gospel has ornated initial and marginalia)</i>
979-980	Index of Gospel of Mark; Prologue of Gospel of Mark	Rubricated majuscule letters
981	No text	Full-page miniature, Portrait of Evangelist Mark
982-1000	The Gospel of Mark	Illuminated title-page with headpiece, initial, and marginalia <i>(each page of this Gospel has ornated initial and marginalia)</i>
1001	Index of Gospel of Luke	Rubricated majuscule letters
1002-1032	The Gospel of Luke; <i>Annotation (p. 1032)</i>	Illuminated title-page with headpiece, initial, and marginalia <i>(each page of this Gospel has ornated initial and marginalia)</i>
1033-1034	Index of Gospel of John; Prologue of Gospel of John	Rubricated majuscule letters
1035	<i>Blank page</i>	--
1036-1059	The Gospel of John	Illuminated title-page with headpiece, initial, and marginalia
1060-1062	Prologue of Acts of the Apostles	Ornated headpiece, initial and marginalia
1062-1064	Index of Acts of the Apostles	Rubricated majuscule letters
1065-1093	The Acts of the Apostles of Luke the Evangelist	Ornated headpiece, initial and marginalia, in-text miniature
1093-1094	Preamble of Epistles	Rubricated majuscule letter
1094-1095	Prologue of Epistle of James; Index of Epistle of James	Rubricated majuscule letters; In-text miniature
1096-1098	The General Epistle of James	Ornated headpiece, initial and marginalia
1098-1099	Prologue of Epistle of Peter; Index of Epistle of Peter	Rubricated majuscule letters; In-text miniature

1100-1103	The First Epistle of Peter	Ornated headpiece, initial and marginalia
1103-1105	Prologue of Epistle of Peter; Index of Epistle of Peter; The Second Epistle of Peter	Rubricated majuscule letters, ornated initial and marginalia
1105-1109	Prologue of Epistle of John; Index of Epistle of John; The First Epistle of John	Rubricated majuscule letters, ornated headpiece, initial and marginalia
1109-1110	Prologue of Epistle of John; Index of Epistle of John; The Second Epistle of John	Rubricated majuscule letters, ornated headpiece, initial and marginalia
1110	Prologue of Epistle of John; Index of Epistle of John; The Third Epistle of John	Rubricated majuscule letters, ornated headpiece, initial and marginalia
1110-1111	Prologue of Epistle of Jude; Index of Epistle of Jude	Rubricated majuscule letters and marginalia
1111-1112	The Epistle of Jude; <i>Annotation (p. 1112)</i>	Ornated headpiece, initial and marginalia
1113-1126	The Book of Revelation	Ornated headpiece, initial and marginalia, in-text miniature
1126-1130	Preamble of Epistle of Paul	Rubricated majuscule letter
1130-1139	Index of Epistles	Rubricated majuscule letters, in-text miniature
1140-1150	The Epistle of Paul to the Romans	Ornated headpiece, initial and marginalia
1150-1151	Prologue of First Epistle of Paul to the Corinthians	Rubricated majuscule letter
1151-1162	Index and The First Epistle of Paul to the Corinthians	Rubricated majuscule letters, ornated initial
1162-1169	Prologue, Index and The Second Epistle of Paul to the Corinthians	Rubricated majuscule letters, ornated initial
1169-1174	Prologue, Index and The Epistle of Paul to the Galatians	Rubricated majuscule letters, ornated initial
1174-1178	Prologue, Index and The Epistle of Paul to the Ephesians	Rubricated majuscule letters, ornated initial
1178-1180	Prologue, Index and The Epistle of Paul to the Philippians	Rubricated majuscule letters, ornated initial
1181-1183	Prologue, Index and The Epistle of Paul to the Colossians	Rubricated majuscule letters, ornated initial
1183-1186	Prologue, Index and The First Epistle of Paul to the Thessalonians	Rubricated majuscule letters, ornated initial

1186-1188	Prologue, Index and The Second Epistle of Paul to the Thessalonians	Rubricated majuscule letters, ornated initial
1188-1197	Prologue, Index and The Epistle to the Hebrews	Rubricated majuscule letters, ornated initial
1197-1201	Prologue, Index and The First Epistle of Paul to Timothy	Rubricated majuscule letters, ornated initial
1201-1204	Prologue, Index and The Second Epistle of Paul to Timothy	Rubricated majuscule letters, ornated initial
1204-1205	Prologue, Index and The Epistle of Paul to Titus	Rubricated majuscule letters, ornated initial
1205-1208	Prologue, Index and The Epistle of Paul to Philemon; Epistle of the Corinthians to Paul; <i>Annotation (p. 1208)</i>	Rubricated majuscule letters, ornated initial
1208-1212	<i>Colophons and annotations</i>	--

Books of the Bible in Canonical Order of the Armenian Church [1]

OLD TESTAMENT

Genesis
Exodus
Leviticus
Numbers
Deuteronomy
Joshua
Judges
Ruth
I Samuel
II Samuel
I Kings
II Kings
I Chronicles
II Chronicles
Ezra
Nehemiah
I Esdras*
II Esdras*
Tobit*
Judith*
Esther (& addtn)*
I Maccabees*
II Maccabees*
III Maccabees*
Job
Psalms (to 151)
Proverbs
Ecclesiastes

Song of Songs
Wisdom of Solomon*
Ecclesiasticus
(Sirach)*
Isaiah
Jeremiah
Lamentations
Baruch*
Letter of Jeremiah*
Ezekiel
Daniel:
 Song of Three*
 Susanna*
 Bel & the Dragon*
Hosea
Joel
Amos
Obadiah
Jonah
Micah
Nahum
Habakkuk
Zephaniah
Haggai
Zechariah
Malachi
Prayer of Manasseh

NEW TESTAMENT

Matthew
Mark
Luke
John
Acts
Romans
I Corinthians
II Corinthians
Galatians
Ephesians
Philippians
Colossians
I Thessalonians
II Thessalonians
I Timothy
II Timothy
Titus
Philemon
Hebrews
James
I Peter
II Peter
I John
II John
III John
Jude
Revelation

* Considered by some as apocryphal.

Reference

1. Movsesian, V. (1984). *The Bible in the Armenian Church*, Western Diocese of the Armenian Church, p. 13.

GLOSSARY

Bible LA 152

This Glossary aims to facilitate the 'visual reading' of the terms used under the title *Illustration* in the Table above, where the texts are provided by their corresponding illustrative elements. A Glossary is presented for each of the four manuscripts.



Ornated headpiece

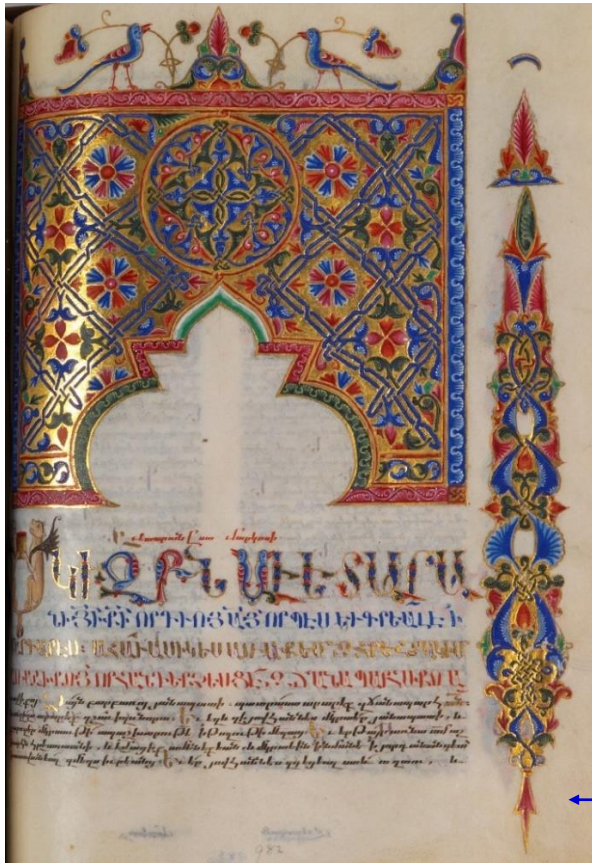
Ornated initial

Rubricated majuscule letters in blue and gold

Ornated marginalia (p.463)



In-text miniature (p.487)



Illuminated title-page with ornated headpiece, rubricated majuscule letters, initial, and marginalia (p.982)



Full-page miniature, Evangelist portrait (p.982)

GOSPEL LA 193

Page	Text	Illustration
1-3	<i>Blank pages</i>	--
4-5	Eusebian Letter	Canon Tables
6-7	<i>Blank pages</i>	--
8-9	Concordance tables	Canon Tables
10-11	<i>Blank pages</i>	--
12-13	Concordance tables	Canon Tables
14-15	<i>Blank pages</i>	--
16-17	Concordance tables	Canon Tables
18-19	<i>Blank pages</i>	--
20-21	Concordance tables	Canon Tables
22-27	<i>Blank pages</i>	--
28	No text	Full-page miniature, portrait of Evangelist Matthew
29	The Gospel of Matthew	Illuminated title-page with ornated headpiece, initial, and marginalia
30-174	The Gospel of Matthew	Almost all the pages include majuscule letters in gold, ornated initial letters, marginalia, and narrative frieze-like unframed miniatures merged into the text
175	<i>Blank page</i>	--
176	No text	Full-page miniature, portrait of Evangelist Mark
177	The Gospel of Mark	Illuminated title-page with ornated headpiece, initial, and marginalia
178-270	The Gospel of Mark	Almost all the pages include majuscule letters in gold, ornated initial letters, marginalia, and narrative frieze-like framed and unframed miniatures merged into the text
270-271	<i>Colophon</i>	--
272	No text	Full-page miniature, portrait of Evangelist Luke
273	The Gospel of Luke	Illuminated title-page with ornated headpiece, initial, and marginalia

274-427	The Gospel of Luke	Almost all the pages include majuscule letters in gold, ornated initial letters, marginalia, and narrative frieze-like framed and unframed miniatures merged in the text; Genealogy of Christ in 78 medallions (292-295)
428	No text	Full-page miniature, portrait of Evangelist John and Prokhoron
429	The Gospel of John	Illuminated title-page with ornated headpiece, initial, and marginalia
430-547	The Gospel of John	Almost all the pages include majuscule letters in gold, ornated initial letters, marginalia, and narrative frieze-like unframed miniatures merged into the text
548-549	<i>Blank pages</i>	--
550	<i>Annotation</i>	--
551	<i>Blank page</i>	--
552-554	<i>Annotations</i>	--

GLOSSARY

Gospel LA 193



Canon Table (p.9)

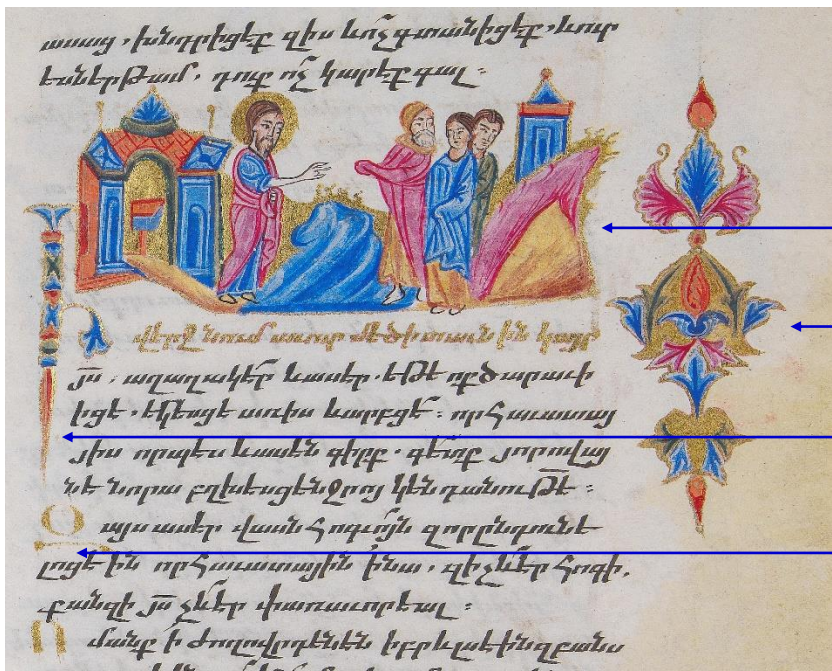




Full-page miniature, portrait of Evangelist John (p.428)



Illuminated title-page with ornated headpiece, initial, and marginalia (p.273)



Narrative frieze-like unframed miniature

Ornated marginalia

Ornated initial letter

Majuscule letters in gold (p.471)



Narrative frieze-like framed miniature (p.411)

GOSPEL LA 216

Folio	Text	Illustration
1r	No text, attached ex-libris paper	--
1v-2r	Eusebian Letter	Canon Tables
2v-3r	<i>Blank pages</i>	--
3v-4r	Concordance tables	Canon Tables
4v-5r	<i>Blank pages</i>	--
5v-6r	Concordance tables	Canon Tables
6v-7r	<i>Blank pages</i>	--
7v-8r	Concordance tables	Canon Tables
8v-9r	<i>Blank pages</i>	--
9v-10r	Concordance tables	Canon Tables
10v-11r	<i>Blank pages</i>	--
11v	Illumination with inscription	Full-page miniature, portrait of Evangelist Matthew
12r	The Gospel of Matthew	Illuminated title-page with ornated headpiece, initial, and marginalia
12v-15v	The Gospel of Matthew	Genealogy of Christ in 39 medallions
16r	The Gospel of Matthew	Full-page miniature, Tree of Jesse
16v-89v	The Gospel of Matthew	Almost all the pages include majuscule letters in gold, ornated initial letters, marginalia, and narrative framed miniatures merged into the text
89v-90v	Index of the Gospel of Mark	Rubrics, majuscule letters in gold
90v-91r	Prologue of the Gospel of Mark	Rubrics, majuscule letters in gold
91v	Illumination with inscription	Full-page miniature, portrait of Evangelist Mark
92r	The Gospel of Mark	Illuminated title-page with ornated headpiece, initial, and marginalia
92v-136v	The Gospel of Mark	Almost all the pages include majuscule letters in gold, sometimes in blue, ornated initial letters, marginalia, and narrative framed miniatures merged into the text
137r-138v	Index of the Gospel of Luke	Rubrics, majuscule letters in gold and blue
139r-141r	<i>Blank pages</i>	Margins ruled in red
141v	Illumination with inscription	Full-page miniature, portrait of Evangelist Luke

142r	The Gospel of Luke	Illuminated title-page with ornated headpiece, initial, and marginalia
142v-211r	The Gospel of Luke	Almost all the pages include majuscule letters in gold, sometimes in blue, ornated initial letters, marginalia, and narrative framed miniatures merged into the text
211v	Prologue of the Gospel of John; <i>Annotation</i>	Rubrics, majuscule letters in gold
212r-212v	Index of the Gospel of John	Rubrics, majuscule letters in gold and blue
213r	<i>Blank pages</i>	Margins ruled in red
213v	Illumination with inscription	Full-page miniature, portrait of Evangelist John and Prokhoron
214r	The Gospel of John	Illuminated title-page with ornated headpiece, initial, and marginalia
214v-262r	The Gospel of John	Almost all the pages include majuscule letters in gold, ornated initial letters, marginalia, and narrative framed miniatures merged into the text
262v-264r	<i>Colophon</i>	--
264v-265r	<i>Blank pages</i>	Margins ruled in gold and red
265v	<i>Colophon and annotations</i>	--
266r-266v	<i>Blank pages</i>	Margins ruled in red

GLOSSARY

Gospel LA 216



Canon Table (f.4r)



Full-page miniature, portrait of
Evangelist Luke (f.141v)



Illuminated title-page with ornated headpiece, initial, and marginalia (f.92r)



Majuscule letter in gold

Ornated (zoomorphic) initial letter

Ornated marginalia

Narrative framed miniatures merged in the text (f.157r)

GOSPEL LA 253

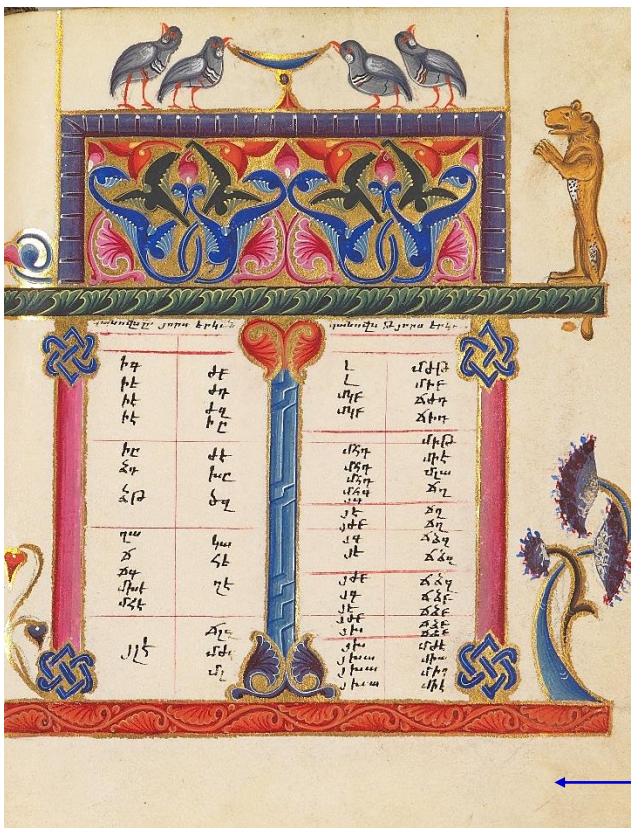
Folio	Text	Illustration
1r-1v	<i>Blank pages</i>	--
2r	<i>Annotation</i>	--
2v-5r	<i>Blank pages</i>	--
5v	No text	Full-page miniature, Annunciation
6r	No text	Full-page miniature, Nativity
6v-7r	<i>Blank pages</i>	--
7v	No text	Full-page miniature, Presentation in Temple
8r	No text	Full-page miniature, Baptism
8v	<i>Blank pages</i>	--
9r	No text	Full-page miniature, Resurrection of Lazarus
9v-10r	<i>Blank pages</i>	--
10v	No text	Full-page miniature, Entry into Jerusalem
11r	No text	Full-page miniature, Washing of Feet
11v-12r	<i>Blank pages</i>	--
12v	No text	Full-page miniature, Betrayal
13r	No text	Full-page miniature, Crucifixion
13v-14r	<i>Blank pages</i>	--
14v	No text	Full-page miniature, Descent from the Cross
15r	<i>Blank pages</i>	--
15v	No text	Full-page miniature, Ascension
16r	No text	Full-page miniature, Pentecost
16v-17r	<i>Blank pages</i>	--
17v	No text	Full-page miniature, Second Coming
18r	Eusebian Letter	Canon Tables
18v-19r	<i>Blank pages</i>	--
19v-20r	Concordance tables	Canon Tables
20v-21r	<i>Blank pages</i>	--
21v-22r	Concordance tables	Canon Tables
22v-23r	<i>Blank pages</i>	--
23v-24r	Concordance tables	Canon Tables
24v-25r	<i>Blank pages</i>	--
25v-26r	Concordance tables	Canon Tables
26v-28r	<i>Blank pages</i>	--

28v	No text	Full-page miniature, portrait of Evangelist Matthew
29r	The Gospel of Matthew	Illuminated title-page with ornated headpiece, initial, and marginalia
29v-92v	The Gospel of Matthew	Most of the pages include majuscule letters in gold and blue, ornated initial letters, and marginalia
93r-93v	Index of the Gospel of Mark	Rubrics, majuscule letters in red and blue
94r	<i>Blank page</i>	--
94v	No text	Full-page miniature, portrait of Evangelist Mark
95r	The Gospel of Mark	Illuminated title-page with ornated headpiece, initial, and marginalia
95v-140v	The Gospel of Mark	Most of the pages include majuscule letters in gold and blue, ornated initial letters, and marginalia
141r-142v	Index of the Gospel of Luke	Majuscule letters in red and blue
143r	<i>Blank page</i>	--
143v	No text	Full-page miniature, portrait of Evangelist Luke
144r	The Gospel of Luke	Illuminated title-page with ornated headpiece, initial, and marginalia
144v-218r	The Gospel of Luke	Most of the pages include majuscule letters in gold and blue, ornated initial letters, and marginalia
218v-219r	Index of the Gospel of John	Rubrics, majuscule letters in red and blue
219v	No text	Full-page miniature, portrait of Evangelist John and Prokhoron
220r	The Gospel of John	Illuminated title-page with ornated headpiece, initial, and marginalia
220v-277v	The Gospel of John (text in f. 277v is unfinished)	Most of the pages include majuscule letters in gold and blue, ornated initial letters, and marginalia (bird-shaped drawings in f. 277v are unfinished)
278r-279r	<i>Blank pages</i>	Lines and columns ruled in black
279v-280v	<i>Blank pages</i>	--

GLOSSARY
Gospel LA 253



Full-page narrative miniature (f.8r)



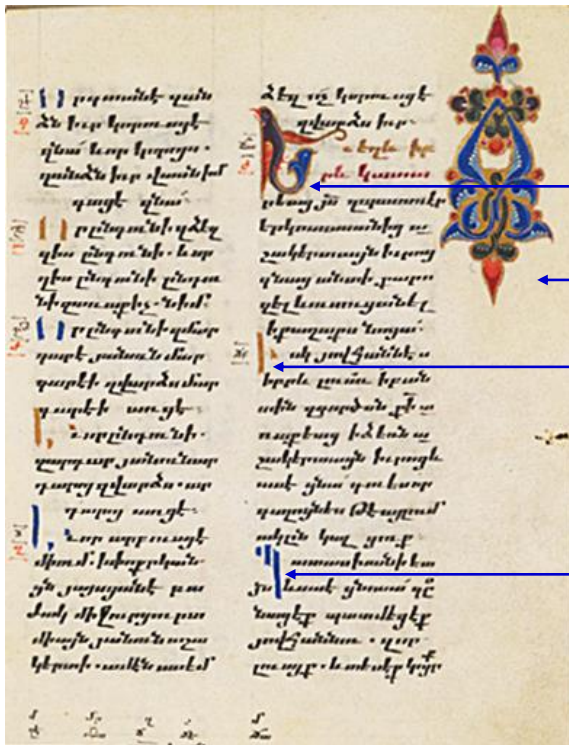
Canon Table (f.24r)



Full-page miniature, portrait of
Evangelist Mark (f.94v)



Illuminated title-page with ornated headpiece,
initial, and marginalia (f.220r)



Ornated initial bird-letter

Ornated marginalia

Majuscule letter in gold

Majuscule letter in blue (f.45r)

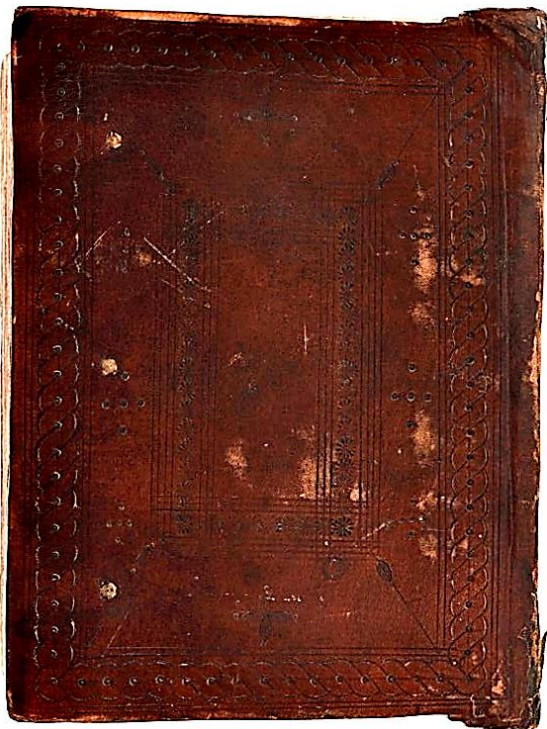
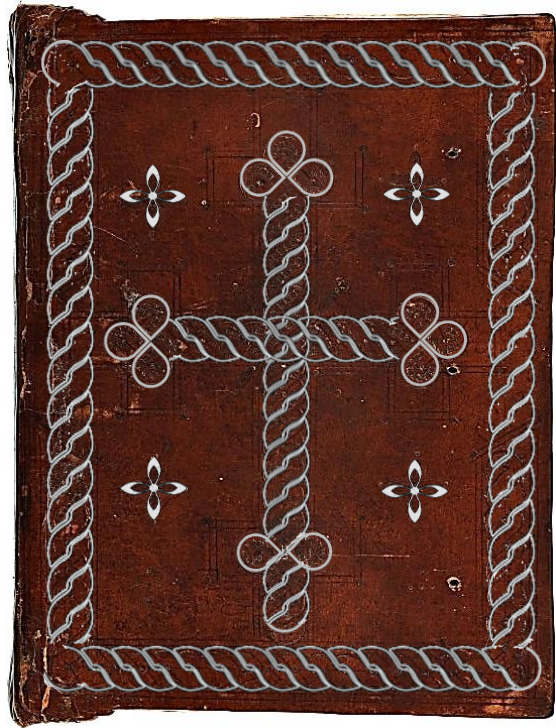
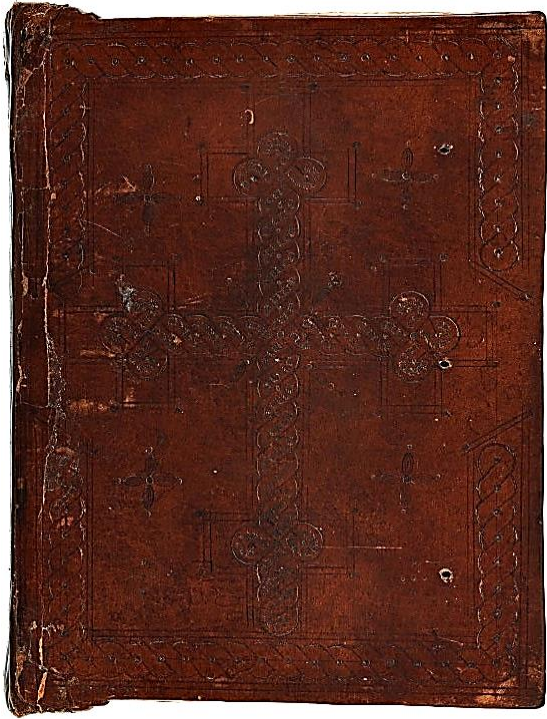
Appendix C

(Chapter 2)

Bookbinding of the Manuscripts

LA 152, Bible, 1623, Constantinople



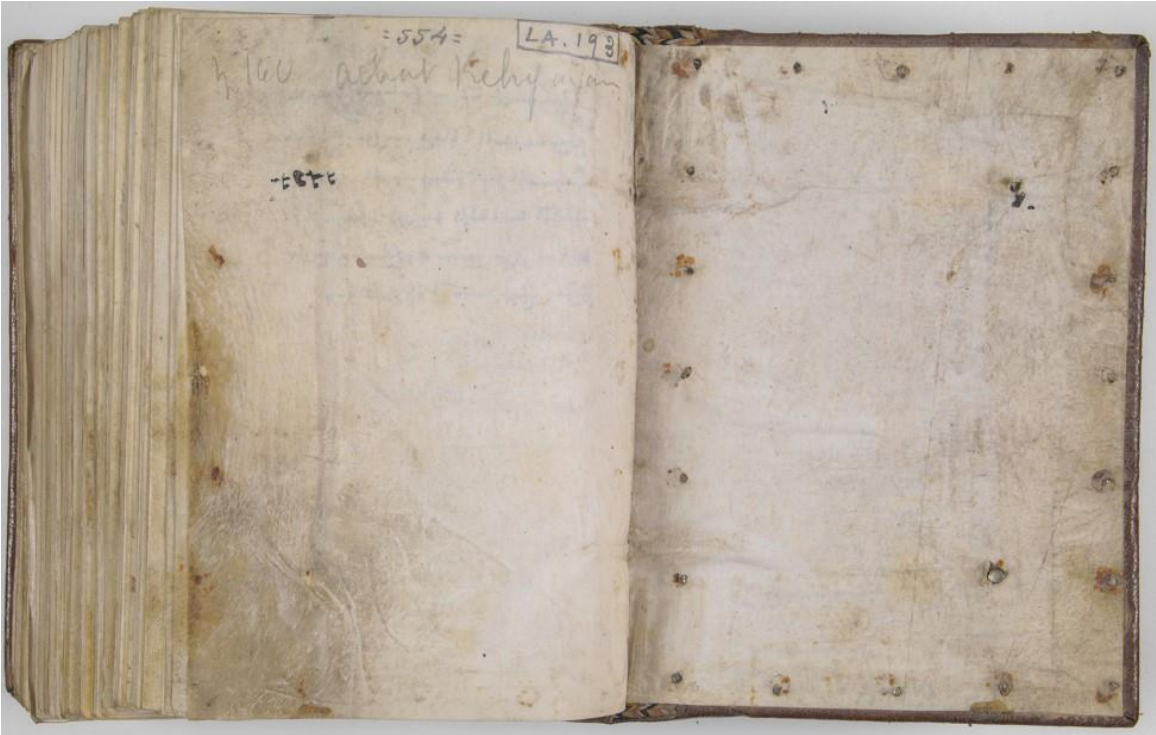
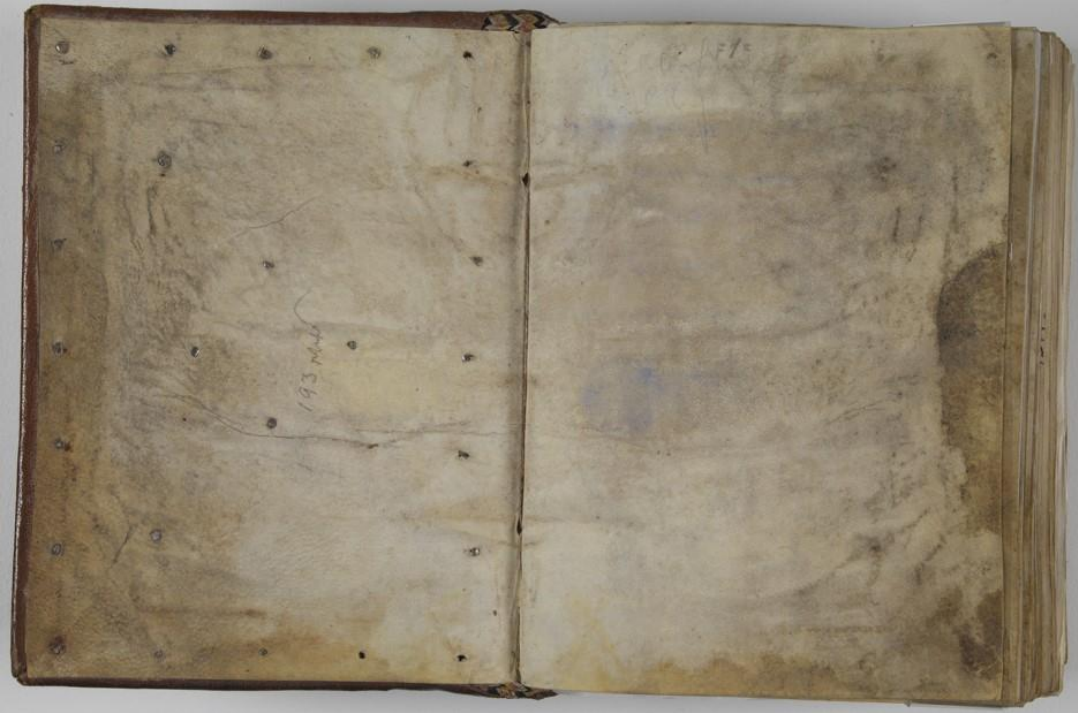




LA 193, Gospel, 17th century, Crimea



LA 193, Gospel, 17th century, Crimea

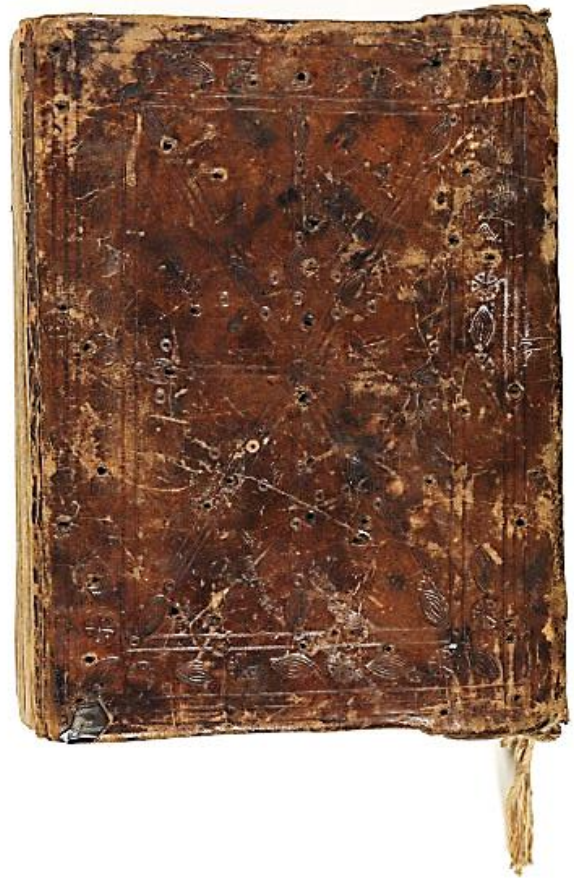
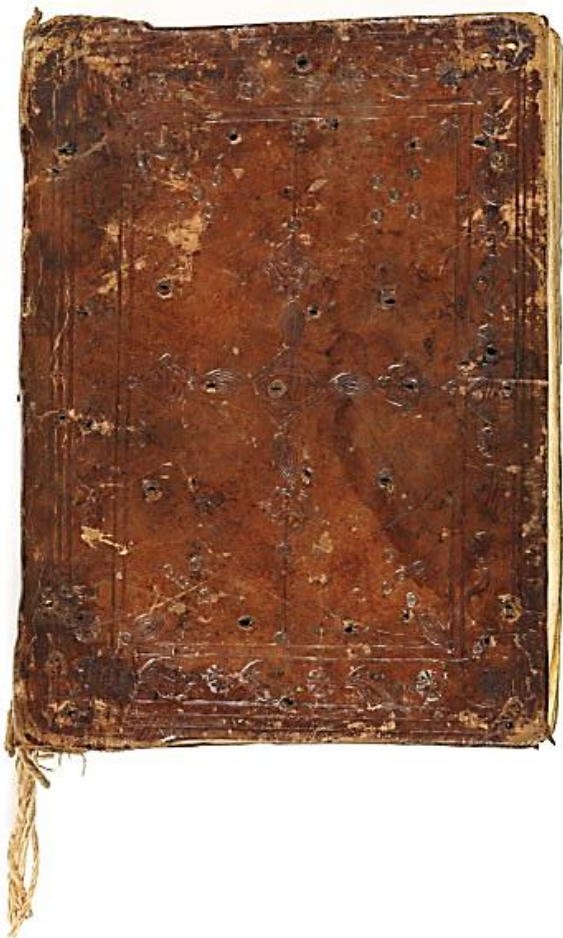


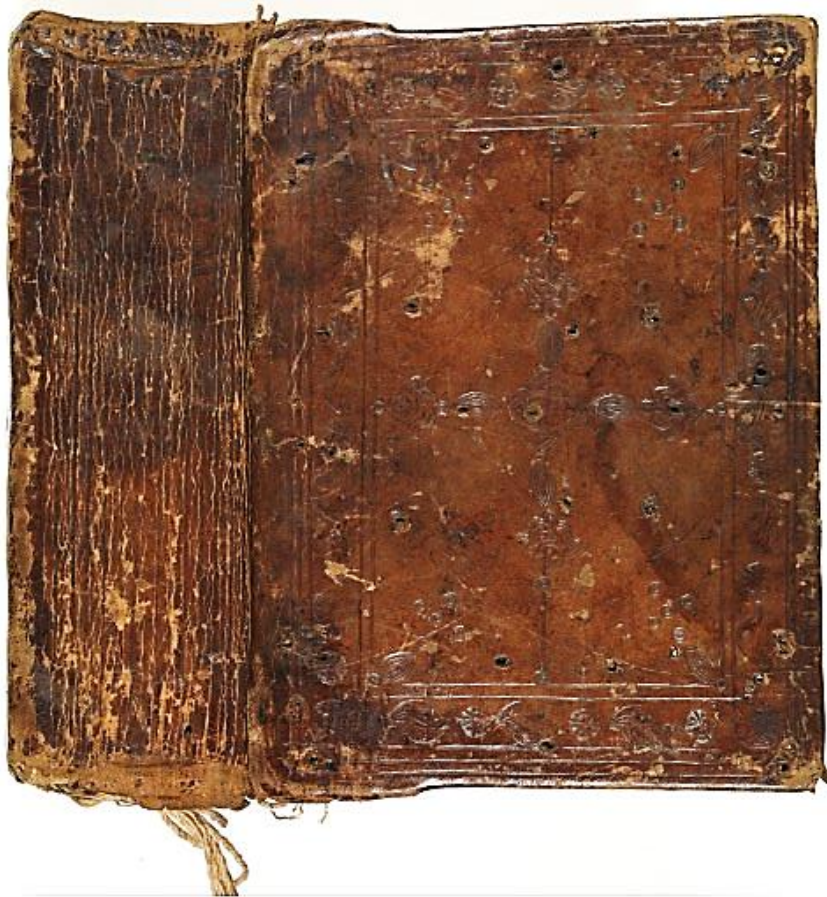
LA 253, Gospel, 17th century, Constantinople (?)

154 mm

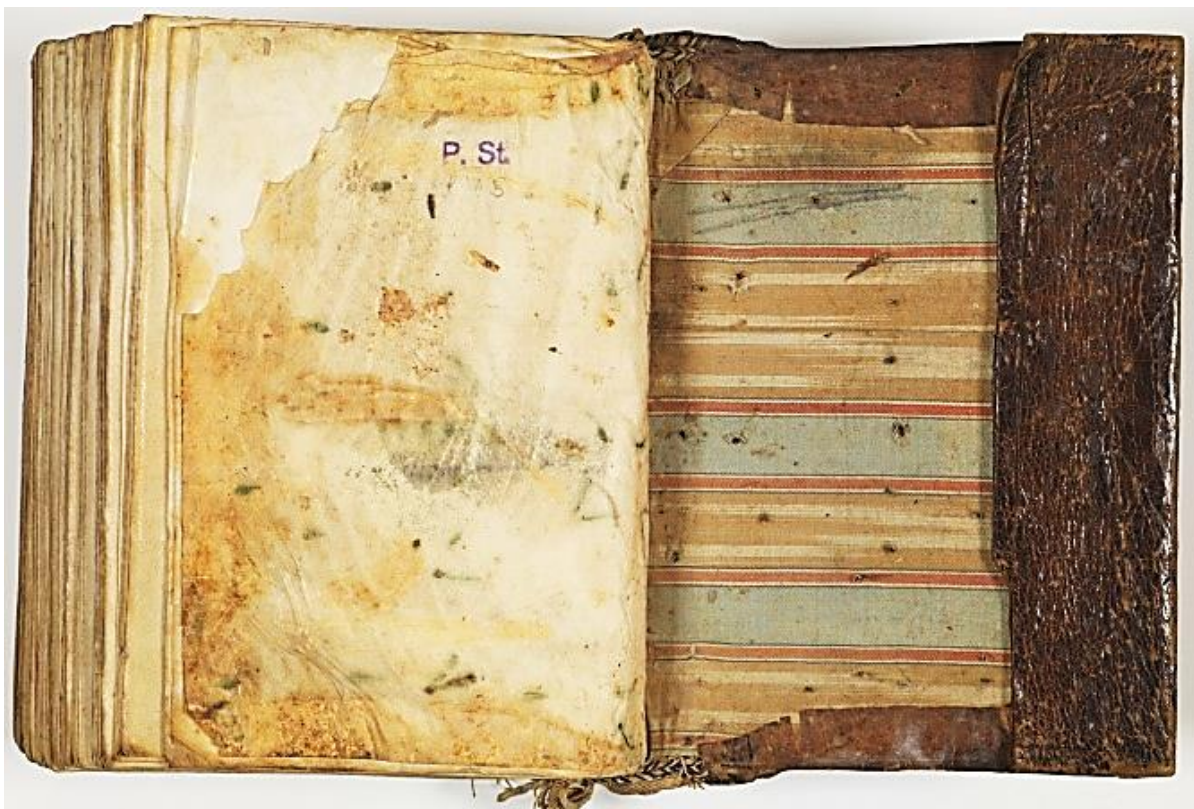


154 mm

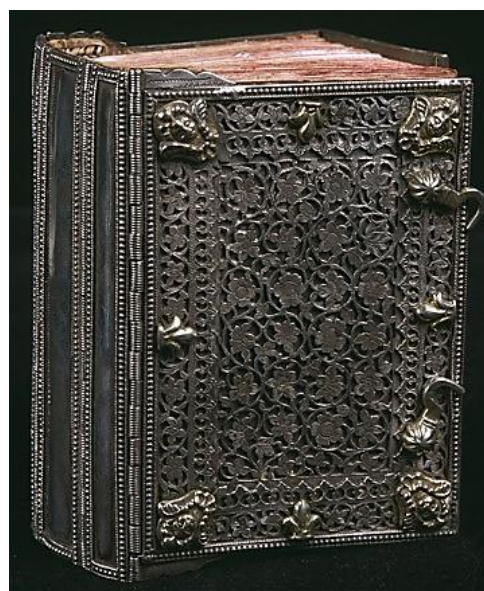




LA 253, Gospel, 17th century, Constantinople (?)



LA 216, Gospel, 1686, New Julfa (Isfahan)



LA 216, Gospel, 1686, New Julfa (Isfahan)



LA 216, Gospel, 1686, New Julfa (Isfahan)



Appendix D

(Chapter 2)

Colophons of the Manuscripts

Appendix D presents the complete transcription of the colophons of Gulbenkian Armenian manuscripts and later annotations in their original language. It is based on our published article in the Armenian language that introduces the codicology and colophons of these manuscripts:

Grigoryan, H. (2022). C'owc'ak Lisaboni Kiwlpênkean t'angarani hayerên jerāgreri [Catalogue of the Armenian manuscripts from the Gulbenkian Museum of Lisbon]. Banber Matenadarani, 34, p. 350-376.

ՅԻՇԱՏԱԿԱՐԱՆ ՆԱԽԱԳԱՂԱՓԱՐ ՕՐԻՆԱԿԻ

1բ Ոտանաւոր եւ շարագրական եւ յիշատակարան Աստուածաշունչ գրոց, արարեալ Ստեփանոս էրէց՝ որդի Ստեփանոսի, ի խնդրոյ պարոն Մելիք աղային, ի թվին ՌՀ. (1621) ամին

Ձա ի թվականիս մեր հայկազեան,
 Որ էր անցեալ քսան յոթելեան,
 Այլեւ քսան /// (ջնջուած) աւելի լրման,
 Գրէցաւ շունչս աստուածական:
 Ստ առաքելոց սրբոց կոյման,
 Որք հաւաքեալ ի մի եղան,
 ԸզՀին եւ Նորրս կտակարան,
 Ձոր աստ շարեմ յարմարական:
 Յառաջ ըսկիզբն Բրիսէթայն,
 Գործք վեցաւրեա արարչութեան,
 Ի կիրակէ աւր տէրունեան,
 Մինչ ի շաբաթն աւր հանգըստեան:
 Արար ըզմարդն յար կազմութեան
 եւ եղ ի դրախտըն փափկութեան,
 Ետուր պատէր անմահական՝
 Չուտել պտղոյն մահացական:
 Սոքա յանցան զպատիրանն,
 Չլուսոյ ծածկոյթըն մերկացան,
 Ելեալ դրախտէն յադինական,
 Անկան յերկիրս այս տրտմական:
 Յետոյ ցաւօք հեծեծեական
 Ծընան երկաւք անասնական,
 Հուսկինն հարիւրերեսնամեան,
 Դարձան ի հող յորմէ ստեղծան:
 Ծընունդք նոցա իսկ բազմացան,
 Լըցին գերկիրս այս մահական,
 Պէսպէս մեղաւք աղտեղացան,
 Մինչ յԱստուածայ աշացն էլան:
 Իսկ արարիչ Տէրն անսահման
 Նա բարկացաւ որդոց մարդկան,
 Ջրրհեղեղեաւ կորըստական
 Եբարձ զհասակ ամէն մարդկան:
 Իսկ աշխարհի սերմ մարդկութեան
 Պահեաց ըզՆոյ իւր ծնընդեամբն,
 Որդիս երրորդ նմա ծնան,
 Յորոց բնաւին աշխարհս լըցան:
 Յետոյ նոցունց ազգ բազմացան,

Ձագիր մեղօք շաղախեցան,
 Մինչ Աբրահամըն պատական՝
 Հոգով սիրող աստուածութեան:
 Ապա Աստուած Տէր զթական
 Իջաւ ի տունն արբահամեան,
 Եկեր ըզգորթն իդիական
 Եվ զբաղարճն անապական:
 Ետ եւ զորդին պարգեական՝
 Ըգիսահակ ծաղր խնդութեան,
 Յորմէ սիրեալ ազգն անմահութեան,
 Յեղն Յակոբա իսրաէլեան:
 Որդիք նորին երկոտասան,
 Ծնան ի յերկիրն Քաղղէական,
 Ռոբէն, Շմաւոն, Ղեթի, Յուդայն,
 Եվ Ջաբողոն ընդ Սաբարայն:
 Գաղն, Եփթաղիմ, Աստե եւ Դան,
 Բենիամին ընդ Յովսեփեան,
 Սոքա ոգիք եալթանասուն,
 Մտին յերկիրն Եգիպտական:
 Մնացին կենօք խաղաղական,
 Մինչ որ Յովսեփ էառ վաղճան,
 Յետոյ նոցունց շարշարեցան՝
 Որպէս գերի անզղջական:
 Այս է ծնունդ գիր նախնական,
 Ձոր գըրեաց Մովսէս անտեսական՝
 Խրատով հոգոյն աստուածական,
 Ուսեալ բնաւին ըզհանգամայն:
 Իսկ գիրք Ելիցն ազատութեան,
 Հրէից ազգին ծառայութեան,
 Նախամեծ արքան զամենայն,
 Յաղագս հրաշիցն որ գործեցան:
 Ապա ըզկնի գիրք Ղեւտական,
 Վասն իրաւանցըն քաւչական,
 Ողջակիզացըն մատուցման,
 Ձոր աստ յիշէ յոյժ զանազան:
 Եւ ապա գիրք Թըվոցն որ կան,
 Յեղապետիցն երկոտասան

Եւ այլ հրաշքն ըսքանչական,
Աստ կայ գրեալ հիացական:
Կրկին օրէնք մովսէսական
է հինգերորդ ըստ խորհրդեան,
Չանցեալ պատւէրքն աստուածական,
Աստ երկրորդի ըսպառնական:
Ապա Յետո որդի Նաւեան,
Չոր յաշորդէ յետ Մովսէսեան,
Չազգըն հրէից ընդ Յորդանան
Անցոյց ոտիւք անթացական:
Իսկ Դատաւորքն երկոտասան,
Որ յետ Յետա յաթոռ նստան,
Նախ Գողոնէլ յաղթող հսկայն,
Մինչ ի Սամվսոն քաջ ախոյեան:
Իսկ Մալաքիմն Իսրայելեան,
Ըսկիզբն ըզծնունդ Սամուելեան,
Ի մէջ սոցա Դաւթի աւծման,
Մինչ մեռանի Սաւուղ կիսեան:
Ապա Դաւիթ որդի Յեսսեան
Նստի յաթոռ արքայութեան,
Սա սիրեցեալ աջ բաւական
Եւ յուսադրող անյոյս մարդկան:
Իսկ Սողոմոն խաղաղութեան
Նստի յաթոռ իւր հայրական,
Որպէս եւ Տէր մեր յաւիտեան,
Թագաւորէ տանն Յակոբեան:
Այլեւ Չորորդ արքայութեան,
Յեղիայէ պատմէ մեզ բան,
Մինչ ի գերիլ տանն Յուդայեան,
Ի յԱսորիս, ի Պարսկաստան:
Դարձեալ պատմէ գիրք Մընացական
Ի յԱդամայ մինչ Սուլիման,
Երկրորդն անտի մինչ Յովսիայն,
Չոր Նեփաւով արքայն եսպան:
Այլեւ Եզրաս գիրք սրբական
Պատմէ զգերիլ տանն Յուդայեան,
Այլեւ զդարձ նոյն գերութեան,
Որ եղեւ յետ եաւթտասնամեան:
Նոյնպէս Երկրորդ գիրքն Եզրական,
Չոր եւ կրկնէ յառաջ նոյն բան,
Երրորդ Եզրան աղօթական
Խնդիրք պէս պէս եւ զանազան:
Գիրք երախտեացըն Նէեմեան,

Որ ած պարիսպ բուշէլիմեան¹,
Իսթերն |Յբ| յազգէ Յետուա Նաւեան,
Չնշող ազգին Ամաղեկայ:
Յուրիա տոհմէ Շմաւոնեան,
Որ զասորոց հզօրն եսպան,
Տովբիթ յազգէ Նեփթալիմեան,
Առնող յուսով ողորմութեան:
Իսկ եւ Յուդա Մակաբայեան,
Նորին եղբայր մեծն Յովնաթան,
Եղիազար, Շմաւոն, Յոհան,
Որդիք գորով Մատաթիայն:
Սոքա ընտիր ազգ պատւական,
Վրէժխնդիրք նախանձական,
Վասն օրինացն աստուածական,
Ի յայլ ազգաց առին վաղճան:
Այլեւ կրկին Մակաբայեան,
Չոր երկրորդէ յառաջնոյն բան,
Իսկ յերկրորդում Մակաբայեան
Պատմէ յաղագս մեծ զաւրութեան:
Աստանօր ժամ է պատմութեան,
Յաղագս Յորա մեծ ճգնութեան,
Սա Ադամայ տիպ եւ նման,
Այլեւ հայի Աստուածըն բան:
Իսկ եւ սաղմոս քնար Դաւթեան,
Եկեղեցոյ երգ հոգեկան,
Ծերոց պարիսպ եւ ամուր վահան,
Տղայոց ուսումն իմաստութեան:
Դարձեալ Առակ խրատ մանկական,
Եւ ժողովողն մէջ հասական,
Իմաստութիւն ծերոց զըկուան,
Չի մի՛ գլորին սայթաքական:
Իսկ Երգ երգոցն անհասական,
Գեր քան զմիտս եւ քան ըզբան,
Յաղագս անախտ փեսայութեան
Եւ անարատ կոյս հարսնութեան:
Այժմ ըսկըսցուք զբանն Եսայեան,
Կայծիւ մաքրեալ ծնունդն Ամովսեան,
Չկոյսն եւ զորդին իւր միական,
Ծանուցանող դէմ յանդիման:
Դարձեալ տեսողքն երկոտասան,
Որք խաւսեցան կենացն ըզբան,
Նախ Ովալ է այր պատւական,
Որ առ երկրորդ կին շընութեան:

¹ Նեեմ. Բ. 17 «Եկայք եւ շինեսցուք զպարիսպս Երուսաղեմի»:

Ապա Ամովս հովիւ վարձկան,
Որ թուփ քաղէր նորոյս նըշան,
Իսկ Միֆիա պատմող ծնընդեան
Ի Բեթղեմեմ տուն Եփրաթեան:
Յովել տեսող սուրբ գալստեան
Ի վերնատունն հոգոյն իջման,
Իսկ Աբդիու տվեալ նշան
Հեթանոսաց նորոգութեան:
Պատկեր Փրկչին քարոզն Յունան,
Ելող կեսեն տիպ յարութեան,
Ապա Նաոււմ եղկեսական,
Որ Նիմուէի սպառնայր յանցման:
Իսկ Ամբակում տե(Կա)սող Փրկչին
Բարձեալ ի խաչ դէմ յանդիման,
Սոփոնիաս սաստիկ գուժկանն
Ժպիր հրէից ժողովրդեան:
Եւ Անգէաս յետ գերութեան
Ասէր տանտէրն նորոգութեան,
Տեսող խաչին եալթնաշահեան
Մեծ մարգարէ Զաւարիայն:
Հրեշտակատիպ Մաղաֆիայն
Ծնանի յերկրին Քաղդէական,
Այլեւ ի տիս նա մանկութեան
Ի Բաբելոն առնու վաղձան:
Յորովայնէ կոյս մաքրական
Սրբեալ հոգովն Երեմիայն,
Որ զխորհուրդ Տեառն գալըստեան
Մեզ քարոզեր յայտ յանդիման:
Իսկ Դանիէլ մաքուր ծերն այն,
Որ Սուրբ Հոգոյն էր բնակարան,
Սա արքայից բաբելական
Մեկնող զերազըն հրաշական:
Տեսող կառաց շորեքկերպեան
Եզեկիէլ որդի Բուզեան,
Որ զգամաքեալ ոսկերք մարդկան
Տեսեալ ի տիպ մեր յարութեան:
Այսոքիկ թիւք խորհրդական,
Եւ մարգարէք աստուածաբան,
Սոքա վկայք մարդեղութեան
Եւ Բանին Հաւր անճառ ծնընդեան:
Երեք մանկունքըն պատական,
Որք ի հնոցին ոչ այրեցան՝
Անանիա, Ազարիայն
Եւ Միսայել մաքուր տղայն:
Որք ըզհրամանն արքունական
Անարգեցին դէմ յանդիման

Զպատկեր Բեղա վիթխարական,
Իբր ըզմեռեալ շուն մի վարկան:
Այլ մատուցին գերգս արհնութեան
Երից անձանցն եւ մի բնութեան՝
Հաւր եւ Որդոյ եւ Սուրբ Հոգոյն,
Պատարագեալ ողջակիզեան:
Իսկ արեգակն արդարութեան,
Էմանուէլ բանն հայրական,
Ի Սուրբ Կուսէն անապական
Ծնաւ մարմնով անճառական:
Յետ երեսուն ամի ծնընդեան
Մկրտեցաւ ի Յորդանան,
Վկայելով ձայնն հայրական՝
Դայ է Որդի իմ միակամ:
Ապա ի լեառն ել փորձութեան,
Յաղթեաց չարին խաբէութեան,
Յետոյ ընտրեաց երկոտասան
Առաքելոց դասք սրբազան:
Արար նըշանըս հրաշական,
Բժըշկութիւնըս զանազան,
Սաստեաց դիւայն հալածական,
Ըզկաղս արար գնացական:
Կուրեաց շնորհեաց լոյս տեսական,
Սրբեաց զբորոտսըն ուրկական,
Բանիւ նորին խուլքըն լուան,
Համերք պէսպէս լեզուս ստացան:
Յարոյց զըմեռեալ բնութիւնս մարդկան,
Որպէս զՂազար չարեքարեան,
Եւ ըզգլորեալ ազգս Ադամեան
Կանգնեաց ի կեանս անմահական:
Իսկ ախտաժէտք առողջացան,
Զրի պարգեւաց արժանացան,
Եւ մեղաւորք արդարացան,
Յորդեգրութիւն Հօրն ընկալան:
Սաստեաց ալեացըն կոհական,
Ըզծովն արար հանդարտական,
Իբր ի վէր տանեաց ձեղուան,
Գնայր ոտիւք անթացական:
Ի լեառն ելեալ Թաքօրական,
Ընդ իւր Պետրոս, Յակոբ, Յոնան,
Սոքա կարծեալ սիւնքն երեքեան,
Բարբառոյ Հօրն արժանացան:
Տեսին զփառս աստուածութեան,
ԶՅիսուս պայծառ արփոյ նման,
Ուստի յահէն զարհուրեցան,
Իբր մեռեալ յերկիր անկան:

Այլ եւ զՄովսէս եւ զԵղիայն
Տեսին փառօք դէմ յանդիման
Ի մեծ լուսոյ արեգական,
Ընդ մերձենալն նուազեցան:
Այսուիկ սոքա զնոսա ծանեան,
Եկեալ վկայք աստուածութեան,
Մովսէս՝ դիմօք անպարական,
Եւ Եղիա՝ թաւարծական:
Ընդ որ Պետրոս՝ զարհուրական,
Խօսէր բանիւ ոչ գիտական,
Ըզտաղաւարսն խորհրդական
Ասէր շինել յարմարական:
Ապա եկեալ ի շարչարան,
Յաղթեաց մահու իշխանութեան,
Այլեւ մարմնով անապական
Խոնարհեցաւ ի գերեզման:
Այլեւ հոգով նա բանական,
Աստուածութեամբն անջատական,
Իջեալ ի դժոխն ըստերական,
Զբանտեալսն արար ազատական:
Երեքարեա յետ սուրբ թաղման
Յարեաւ փառօք անհասական,
Երեւեցաւ ինկաբերիցն,
Յետոյ գնդին սուրբ մետասան:
Քառասնօրեա յետ յարութեան
Վեր համբարձաւ անձառ կայանն,
Յետոյ գայցէ ի դատաստան՝
Առնուլ համար գործոց մարդկան:
Իսկ առաքեալքն յետ համբարձման
Ըզխոստացեալ հոգին զգեցան,
Լեզուս հրեղէնս բարբառեցան,
Զոր տայր հոգին թելադրական:
Ապա գրեցին զաւետարան,
Շնորհօք Հոգոյն որպէս տուան,
Զի աւժանդակ քարոզութեան
Ընդ ինքեանս առցեն նպաստական:
Նախ Մատթէոս՝ տիպ մարդկութեան,
Ապա Մարկոս՝ առիւծնման,
Ղուկաս՝ բըժըշկ ցուլն հերկական,
Յետոյ արժւի մաքուրն՝ Յոհանն:
Այլեւ գետոցն աղենական,
Գանգէս՝ քատակ Մատթէոսեան,
|5բ| Զեհոն՝ Մարկոս ըստ զօրութեան,
Դկլաթ՝ Ղուկաս վաստակ կրական:
Եփրաթ՝ ուրոյն կոյսն Յոհաննէս,
Երթայ անխառն յԱսորեստան,

Ապա խառնի Տիգրիս ի նմա՝
Մտեալ ի ծովն Պարսկական:
Որպէս եւ նա առանձնական
Երթայ մինչեւ ի շարչարան,
Ապա անտէն իսկ միանան,
Խառնին ի ծովն աստուածական:
Դարձեալ խորհուրդն մին՝
Նման ընդ շորս մասանցըն մարմնական,
Խոհեմութիւն Մատթէոսեան,
Արիութիւնըն Մարկոսեան:
Իսկ ողջախոհըն յարութեան,
Որ է Ղուկասն հելլիական,
Յոհաննէս՝ տիպ արդարութեան,
է գերագոյն քան զամենեան:
Ապա ընթեռ սմին եղան
Առաքելոց պրակն որ կան,
Յետոյ զտեսիլըն պատմական՝
Որպէս ետես մաքուրն Յոհանն:
Յետոյ զնշումն իւր Հանգըստեան
էր ընդ եղբարսն աղաւթական,
Իսկ յետ շորից աւուրց թաղման
Փոխի ի կեանս անմահական:
Ապա գիրք սուրբ շորեքտասան
Առաքելոյն սուրբ Պողոսեան,
Նախ Հըռովմայ Դաղմատական
Գըրէ օրէնք մնացական:
Իսկ Երկրորդ թուղթ Կորնթական
Գըրէ պատէր հաստատական,
Դաղատացոց նոր պատուիրան
Գրէ հակիրճ պատկանական:
Եփեսացոցն Ասիական
Գըրէ խրատ յարմարական,
Փիլիպեցոցըն բարութեան
Գըրէ պատէր ուրախական:
Կողոսացոցն հաստատութեան
Չանսալ հրէիցըն խտրութեան,
Թեսաղոնիկ Մակեդոնեան
Երկրորդ գրէ թուխթ ըղձական:
Զորս եւ պսակ ուրախութեան
Իւր անուանէ ըստփոխական,
Զի աներեկ աւրն յարութեան,
Մատուցանէ Երրորդութեան:
Եւ յետ սոցա Եբրայեցոց
Գրէ օրինացըն փոփոխման,
Յետ այսորիկ Տիմոթէան
Կրկին գրէ թուխթ զգոյշութեան:

Իսկ Տիտոսի ընդելական
Գրէ պատուէր նա քօշական
Փիլիմոնի խառայական,
Գրէ նմին ազատութեան:
Կաթուղիկէքն եւթանեքեան,
Զոր գրեցին ընդհանրական,
Նախ Յակովբոսըն Յովսէփեան,
Եղբայր Տէրն համշիրական:
Ապա Պետրոս վէմն անսասան
Երկրորդ գլրէ թուխթ խրատական,
Իսկ |Յա| Զեբեթէս որդին Յոհան
Գլրէ երրորդ մեզ պատւիրան:
Ապա Յուդա, որ Յակոբեան,
Գրէ խրատ նա եզական,
Զի յայրմանէ գեհենական,
Զերծեալ ապրիմք յօրն անվաղճան:
Դարձեալ է գիրք աստուածաբան,
Եկեղեցոյ ամուր վահան,
Որպէս գրէ դամասկացին,
Սուրբ վարդապետն Անանիայն:
Գիրք Յակոբա, որք կարգեցան
Թաղէնսին կանոնական,
Առաքելոց կրկին կանոնքն
Գիրք անմարմնոց Դիոնեսեան:
Եւ Պետրոսի քարոզութեան
Եկեղեցոյ սրբոյ հիման,
Որ է երեալ Դաղմատական
Յաթողըն սուրբ Լատինական:
Այսքան գրոց փափաքեցաւ
Խօջա Նագարըն պատուական
Եւ ետ գրել իւրն յիշատակ
Անջընջելի մինչ յաւիտեան:
Եւ իւր որդոցըն բաղձական՝
Սարֆրազ բէկին յոյժ ըղձական,
Էլիազին եւ Հայկազին՝
Բողբոջ բուսեալք վայելչական:
Եւ ծնողացն իւրոց որ կան,
Ի յանդրանկաց հոգոց կայան,
Եղբարց իւրոց եւ քվերաց
Եւ ընդանեացըն հանրական:
Զոր Տէր Աստուած մեր յաւիտեան
Պահէ անփորձ եւ անսասան,
Եւ յետ աստեացս արքայութեան

Ամենեքեան լինին արժան:
Իսկ ես՝ նուաստ անձն անարժան,
Ձիք Ստեփանոս մեղաց աման,
Չարեաւք լրցեալ, բարեաց ունայն,
Եւ սրիկայս քան զամենայն:
Այսքան գրոց աստուածական,
Զոր շարեցի անբանական,
Զձեզ աղաչեմ որք հանդիպիք,
Զմեղադրել իմ լրբութեան:
Զի ես տկար եւ սխալական,
Զեռնարկեցի յօժարական,
Գրեցի կրկին սուրբ Կտակարան,
Ոտամբ չափեալ ըստ Հոմերական:

ՅԻՇԱՏԱԿԱՐԱՆ ԳՐԶՈՒԹՅԱՆ ԺԱՄԱՆԱԿԻ

87բ Աւգնեա՛, Յիսո՛ւս միաժին, եւ հա՛ն զիս յաւարտ:

137բ ԶՅակոբ գրիչ աղաչեմ յիշել ի Տէր:

295բ ԶՅակոբ գրիչ աղաչեմ յիշել ի Տէր:

462ա ԶՅակոբ գրիչս յիշէ՛ք ի սուրբ յաղաւթս ձեր:

942ա Աւարտի սա յԱւգոստոս ԻԳ. (23) արն:

1032ա Ապիկար զՅակոբ քարտողարս յիշեցէ՛ք ի մեղաց թողութիւն. ամէն:

1112ա Զմեղաւոր հողս Յակոբ, զհայրն իմ Պաղտասար եւ զմայրն իմ Յուսաբանէ՛ յիշեցէ՛ք ի մեղաց թողութիւն: Եւ Աստուած զձերն թողցէ. ամէն:

1208ա Զմեղաւորս Յակոբ յիշեցէ՛ք ի Տէր ողորմեայիւ:

1208ա Փառք ամենասուրբ երրորդութեանն՝ Հար եւ Որդւոյ եւ Հոգւոյն Սրբոյ, այժմ եւ միշտ եւ յաւիտեանս յաւիտենից. ամէն: Հասեալ իցես յատակս ծովու եւ զհետ ան:

1209բ Սովորութիւն է աստուածայնոց արանց միշտ եւ հանապազ խոկալ յաստուածային պատկրանս՝ ի տուէ եւ ի գիշերի զվերինն խորհել, ուր Քրիստոս նստի ընդ աշմէ Աստուծոյ: Եւ վասն բազում պատճառի, բազումք փափագին ջերմեռանդ սիրով եւ ըղձալի ցանկութեամբ արդիւնս եւ գործս կատարել: Նախ՝ վասն յուսոյ յաւիտենական եւ անմահ կենացն զանցաւորս արհամարհեն եւ զայն ստանան կեանս, որ մնացական է, որպէս ասէ Տէրն. Երթայք, գործեցէ՛ք մի՛ զկորստական կերակուրն, այլ զայն, որ մնա ի կեանսն յաւիտենական: Երկրորդ՝ զի մեք ապականացու եւ մահկանացու գորով, ոչ նոյնպէս կամք մնամք, որպէս ասէ մարգարէն՝ Պանտուխտ եւ անցաւոր եմք, որպէս եւ ամէն հարքն մեր, ստանամք զգիրս զի անապական կենացն արժանի լիցուք շնորհօքն Քրիստոսի: Երրորդ՝ զի հրամայէ Տէրն. Գանձեցէ՛ք ձեզ գանձս յերկինս, որ ոչ ցեց եւ ուտիչ ապականեն, եւ ոչ գողք ական հատանեն եւ գողանան, գրեմք զգիրս, որ զամէն գանձս ի յինքն պարունակեալ ունի՛ նախ զվերին իմաստութիւն եւ ապա զստորինսն, որ գրեալ կան ի սմա: Զորրորդ՝ վասն պայծառութեան եւ նորոգութեան նորոյս Սիոնի, որով միշտ սովաւ լուսաւորի, որպէս ասէ Պօղոս առ Տիմոթէոս. Ի գալն քո զմատեանս բերջիր. ի յայս միտս գրեցան ամէն Հին եւ Նոր Կտակարանք: Հինգերորդ՝ վասն օգտութեան եւ բարեզարդութեան եւ իմաստութեան հանճարոյ եւ աստուածաշտուութեան մանկանց եկեղեցոյ, զի ամէն ուսումն եւ առաքինութիւն տեսական եւ գործնական աստուածային գրովք լինի, որպէս ասէ Պօղոս. Զգիրս սուրբս գիտես, որ կարող են զքեզ իմաստուն առնել: Վեցերորդ՝ վասն բարեխոսութեան միշտ եւ անդադար առ Աստուած, զկենդանի բանս աստուածային գրեմք եւ մարմնացն եմք ի քարտիսի, որպէս եւ բանն Աստուած մարմնացաւ եւ փրկեաց զմեզ ի մեղաց եւ մահու, եւ արժանացոյց անմահ կենացն, նոյնպէս եւ բանս գրեալ հաւատով եւ յուսով զամէն խնդրածս մեր կատարէ աստ եւ ի հանդերձեալն: Եւթներորդ՝ զի զպատմութիւն սրբոցն որք ի հընումն եւ ի նորումս, զի համարձակութիւն ունին առաջի Աստուծոյ բարէխաւսել միշտ վասն անձանց մերոց այժմ եւ յաւուրն դատաստանի: Ութերորդ՝ վասն անջինջ յիշատակութեան առաջի Աստուծոյ, ոչ ունելով զերկրաւոր ինչ ի պէտս մեր, զսա ստացաք մեզ զաւակ եւ յիշատակ անմահ, ըստ մարգարէին. Երանի որ ունիցի զաւակ ի Սիոն եւ ընդանեակ յերուսաղէմ: Իններորդ՝ վասն քաւութեան եւ թողութեան մեր մեղացն, բարեխօսութեամբ սրբոցն հնոցն եւ նորոցն, որպէս ասէ Տէրն. Արարէ՛ք պտուղ արժանի ապաշխարութեան, եւ մարգարէն ասէ. Զմեղս քո ողորմութեամբ քաւեսցես, եւ զանօրենութիւնս քո՝ տրօք տնանկաց: Տասներորդ՝ վասն պատելոյ զտօնս հին եւ նոր սրբոցն ստանամք զգիրս, զարդարեմք ոսկով եւ գոյնզգոյն երանկով, որպէս ասէ Տէրն. Զաղքատս յամէն ժամ ընդ ձեզ ունիք, այլ զիս ո՛չ: Մետասանորդ՝ վասն ներբողական գովասանութեան իւրաքանչիւր սրբոցն ստանամք զգիրքս, որպէս ասէ Սողոմոն. Ի գովութիւն արդարոց ուրախանան ժողովուրդք, եւ Դաւիթ ասէ. Յիշատակ յաւիտենից եղիցի արդարն, եւ Պօղոս ասէ. Ի պէտս սրբոցն հաղորդեցարուք: Երկոտասանորդ՝ վասն ի նախանձ եւ ի փափագ շարժելոյ զայլս՝ ճշմարիտ արդեանց եւ բարի գործոց, որպէս ասէ Պօղոս. նախանձաւոր

լերուք շնորհացն, որ լան են: Եւ Քրիստոսի փառք յաւիտեանս. ամէն:

Արդ, ի ժամանակին, յորում էր թվական հայոց ՌԾԳ. (1604), ել շահ Ապաս արքայն Պարսից յերկիրն Հայոց եւ էառ մեծաւ յաղթութեամբ զամէն ամուրս աշխարհին ի տաճկաց, եւ յետ ամի միոյ ել զօրավարն Տաճկաց ընդդէմ նորա, որում անուն էր Զոլաթլի, անհամար զօրօք, եւ նա խոյս տուեալ ի նմանէ, դարձաւ յետս, եւ ի դառնալն արար զՋուլայ տարագիր ի հայրենի բնակութենէն մերմէ եւ բերեալ բնակեցոյց զմեզ ի մայրաքաղաքն իլամացոց՝ ի Ասպահան, եւ ետ |1210ա| մեզ գետին շինելոյ տուն՝ ի հարաւակողմ քաղաքին, ի վեր գետոյն Ուբաղայ, զոր պարսիկք Զընդառուր կոչեն, որ ասի՝ գետ կենդանի: Եւ շինեցաք անդ տուն բնակութեան՝ առաւել եւ գեղեցիկ քան զառաջինն, եւ անուանեցաք Նոր Զուլայ՝ ի վեր հնոյն կրկին եւ երեքկին գեղեցիկ: Եւ յետ ի Գ. ամի ես՝ Խօջայ Նազարս՝ որդի Խօջայ Խաչիկի, ցանկացա Աստուածաշունչ գրոց՝ ի սփոփանս եւ ի մխիթարութիւն ինձ, եւ լուս թէ ի Կոստանդնուպալիս գտանի նօտար եւ քաջ քարտաւար, եւ մեծաւ փափագանօք յուղարկեցի, որ գնացեալ ետուն գրել զցանկալի եւ զփափագելի գիրքս, որ կոչի Աստուածաշունչ, վասն զի ունի յինքեան պարունակեալ զըշին եւ զնոր Կտակարանս Աստուծոյ շնչեալ, վասն այնորիկ կոչի Աստուածաշունչ՝ կոչեցեալ առաքելեցն սրբոց: Գրեցաւ Աստուածաշունչ տառս ձեռամբ Յակոբ դպրի, ի վայելումն իշխանաց իշխան եւ պարոնաց պարոն Խօջայ Նազարին եւ որդոցն իւրոց՝ պարոն Սարֆրազ բէկին, Էլիազին, Հայկազին, զոր Տէր Յիսուս անփորձ եւ անասան կենօք պահեսցէ մինչեւ ի խորին ծերութիւնն. ամէն: Եւ էր ի գրչութիւն սորա ի թվականին հայոց ՌՀԲ. (1623) ամին, բայց յորժամ բերաւ ի յԱսպահան, ի յաստուածապահ քաղաքն Զուլայ, էր թվականն ՌՀԸ. (1629), ի յԱւագ Զատիկին: Որ ի սոյն ամի մեռաւ շահ Ապաս արքայն Պարսից, որ յոյժ սիրէր զըսալայ Նազարն զամէն ժամանակս կենաց իւրոց, եւ զամէն զոր ինչ ասէր Խօջայ Նազարն, քաղցրութեամբ լսէր նմա թագաւորն, զով կամէր՝ մեծացուցանէր, եւ զով կամէր՝ ի փառաց եւ ի պատուոյ ընկենուր գնա թագաւորն: Եւ յաջորդեաց զինի շահ Ապասին թոռն նորին շահ Սէֆի: Արդ, ի սոյն ամի նրստաւ յաթոռ սրբոյն Գրիգորի Լուսաւորչին տէր Մովսէս Տաթեւացին՝ այր սըրբասընունդ եւ խարազնազգեաց, կոռակիւրօն եւ ճգնասէր, արդիւնարար եւ գիտնական, վրէժխնդիր աստուածային օրինաց եւ անուանի վարդապետ, ըստ ընկալեալ ամէն Հայոց, որ նորոգեաց զՍուրբ Էջմիածինն եւ այլ բազում եկեղեցիս, ըստ նրմանութեան Լուսաւորչին, ձեռնատրուութեամբ եւ օժանդակութեամբ Խօջայ Նազարին, գեղծեալ եւ զապականեալ կարգ եւ զկրանս հայոց վերստին նորոգեաց եւ բազում որդիս ի փառս էաժ, որ են ճշմարիտ պատարագօղ Քրիստոսի, որպէս զինքն, որպէս ասէ սուրբ Աւետարանն. Յիսուս առնէր եւ ուսուցանէր, այսպէս եւ սուրբ վարդապետս մեր եւ հայր հոգեւոր ամէն հայոց Մովսէս անձանձիր առնէ եւ ուսուցանէ, վարդապետէ եւ քարոզէ, խրատէ եւ յանդիմանէ, եւ ինքն գործով կատարէ, ցուցեալ վարդապետութիւնս՝ զգործս ամբիծս եւ զվարս մաքուրս, որպէս եւ փայլէ յաւուրս մեր, որպէս զղամբարս լուսաւորս, զոր Տէր Յիսուս պահեսցէ իբրեւ զսին հաստատուն մինչ ի խորին ծերութիւնն՝ ի պարծանս հայկազան սեռի, եւ յետ աստեացս ընդ սուրբ հայրապետացն եւ ընդ մաքուր վարդապետացն դասակից եւ պսակակից արասցէ. ամէն: Եւ ի դիտապետութիւն մերոյ քաղաքիս Զուլայոյ Խաչատուր կոռակիւրօն արհի եւ պանծալի եպիսկոպոս Կեսաւացոյ, որ է աշակերտ սուրբ հայրապետին Մովսէսի, զարդարեալ ամէն առաքինութեամբ:

Արդ, բաղձանօք ցանկացաւ այսպիսի անկողոպտելի գանձիս եւ անթառամելի բուրաստանիս, անքակտելի ապարանիս եւ անմաշելի զարդիս, անշիջանել զամբարիս եւ անաղօտ լապտերիս, անգին մարգարտիս եւ անգիւտ գահարիս, անըսպառելի յետնորդիս եւ անշինջ յիշատակիս, որ ըստացաւ զԱստուածաշու[ն]չ տառս պարոնաց պարոն՝ պատուեալ եւ մեծարեալ ի թագաւորաց ջուղայեցի Խաչայ Նազարն՝ յիշատակ հոգոյ իւրոյ եւ ծնօղաց իւրոց՝ հօրն իւրոյ աստուածասէր եւ մեծահաւատ, ազատաց ազատ Խօջայ Խաչիկին, եւ մօրն իւրոյ՝ խոնարհամիտ եւ հեզահոգի Մարիամին, յիշատակ սոցին արհնութեամբ եղիցի. ամէն:

Դարձեալ յիշեցէք զԽօջայ Նազարն եւ զեղբարքն իւր՝ զպարոնաց պարոն Խօջայ Սաֆարն, զՍինանն, զԶվանի եւ զԲաղումն, եւ քրեւրքն իւր՝ զԵգաթիխասն, Ազատն եւ զըսայթային, Տէր

Աստուած ողորմեսցի սոցա ըստ մեծի ողորմութեան իւրում. ամէն. եղիցի:

Դարձեալ յիշեցէ՛ք զհօջայ Նազարն |1211բ| եւ զկողակիցքն իւր՝ զԽաթուզանն եւ զՄարիամն, եւ զորդիքն իւր՝ զպարոն Սարփրազն, Էլիազն, Հայկազն եւ հանգուցեալ ի Քրիստոս Վարթանն, եւ այլ հանգուցեալ որդոցն եւ դստերացն Քրիստոս Աստուած ողորմեսցի. ամէն:

Դարձեալ յիշեցէ՛ք զհօջայ Նազարն եւ զմեծ պապն իւր՝ զՄելքոնն, եւ զհանիկն իւր՝ զՇանիխասն, եւ զհօրեղբարքն իւր՝ զհօջայ Բաբայն եւ զՎարթանն եւ զԵղադուբն, Տէր Աստուած զսոսա արքայութեան արժանի արասցէ. ամէն:

Դարձեալ աղաչեմ յիշել ի սուրբ յաղաւթս ձեր զպայազատ եւ զմեծաշուք, զպատուեալն իշխանութեամբ եւ ճոխութեամբ զԽաւրայ Նազարն, որ ըստացաւ զԱստուածաշունչս ի հալալ վաստակոց իւրոց, ի սփոփանս անձին իւրոյ եւ ի պայծառութիւն սուրբ եկեղեցւոյ եւ ի յուսումն մանկանց նոր Սիրնի, որոյ վարձատրեսցէ Քրիստոս Աստուած միոյն հարիւրապատիկ, հազարապատիկ, բիւրապատիկ, աստ եւ ի հանդերձելումն, եւ երկնից արքայութեանն արժանի արասցէ, հանդերձ ամէն ննչեցելովքն իւրովք, եւ զըՍտեփանոս գծողս ընդ նմին. ամէն. եղիցի:

ՅԻՇԱՏԱԿԱՐԱՆ ՀԵՏԱԳԱՅԻ

1211բ ԹՎին ՌՃԲ. (1653) Մելքոնն ծնաւ՝ Սուրբ Սարգիսն անցած Դ. շաբաթ օր:

ԹՎին ՌՃԳ. (1654) Էլիազն ծնաւ՝ Սուրբ Գրիգորի պահք ուրբաթ օր:

ԹՎին ՌՃԴ. (1655) Նազարն ծնաւ՝ Սուրբ Խաչին բարեկէնդան կիրակի օր, Գասպար:

ԹՎին ՌՃԶ. (1657) Մամէն ծնաւ յինանց միջնոցն, ԹՎին ՌՃԸ. (1659) Թամարն ծնաւ աղուհացից մէջինք օր:

Որդոց որոտման օրն տօն վեռեց:

Յակոբ, Էգազն, Յոհանն, Էլիազն, Մարիամ, Սափուռն վեռեց, որ ամէն տարի կատարեն:

1211բ (Այլ ձեռքով) Արդ, յերես անկեալ աղաչեմ հանդիպողացդ եւ պատահողացդ, որք հանդիպիք ի սմա կարգալով կամ տեսանելով, յիշեսցիք ի մաքրափայլ յաղօթըս ձեր զԽօնայ Նազարն եւ զկողակիցն իւր զԽաթուզանն, եւ զորդին իւր ըզհօջայ Հայգազն, եւ զսորին կողակիցն Նանաշանն եւ զՍափուռն, եւ զորքին² իւր զպարոն Մելքոնն, զպարոն Էլիազն, եւ զպարոն Նազարն, որ ի Թուրին ՌՃԻԳ. (1674) որ Դամայ ամսոյն ԺԳ. (13) եւ Հոկտեմբերի ամսոյն Գ. փոխեցաւ առ Քրիստոս, զոր եւ Տէր Աստուած իւր տեսոյն արժանի արասցէ: Եւ զուստերքն յիշեցէ՛ք ի Քրիստոս, Թամարն եւ Շէիխասն եւ Ուրուլուն եւ Օղլանն եւ Մամէն եւ միւս Թամարն եւ Մասիինն եւ զԼիխանն եւ Սամարբուին, եւ սոցին սպասաւոր Տաակումն, եւ ամէն արեան մերձաւորսն յիշեցէ՛ք եւ Աստուած ողորմի ասացէ՛ք. ամէն, Հայր մեր:

1211բ (Այլ դժուարընթեռնելի նոտրգրով) Ի Թուականին ՌՃԻԹ. (1680) Նախայ Լ. (30) Վարդավառ կիրակի օր ծնաւ Սաֆարն ի մօրէ, Տէր Աստուած ընդ երկայն աւուրս պահեսցէ:

ԹՎին ՌՃԼԱ. (1682) Դամար ԻԳ. օրն Ե. շաբաթ Նազարն ծնաւ մօրէ:

ԹՎին ՌՃԼԳ. (1684) Նիրան ԺԵ.ումն (15) ծնաւ Սաֆազն ի մօրէն:

1212ա ԹՎին ՌՃԽ.ումն (1691) Համիրայ մինումն Սուլթանումն ծնաւ ի մօրէ:

Փոքր ԹՎին ՉԵ. (1701) Արամ Գ.ումն Յոհանէսն ծնաւ ի մօրէ:

1212ա (1796 թ. այլ խրթին, անփոյթ նոտրգրով*) Յորպէս Խօջա Նազարն ի Թիւլ Թվականութեան 1072 (1623) Յացիցի գանձեցաւ սա գանձս ի պատուական ձեռամբն Յակոբոս դպրի ի Կոստանդնայալոյս: Այսպէս կարով մնաց ի վայելումն նորին սերնդոց մինչեւ ի նոյն Թվին

² Սխալագրութիւն է. ճիշտը՝ «գորդին»:

* Յաշորդոլ ընթերցում-վերձանութիւնը Մաշտոցեան Մատենադարանի գիտաշխատող Քնար Յարութիւնեանի – Խմբ.:

1140 (1691), որում վայելեցին սերնդօք իփր 68 ամս, յորպէս ցուցանէ ի վեր յիշատակագրութիւնք անուն Սուլթանումի: Այնուցեա զինչ լինիլն կամ գիրքս յումմէ առ ումէք փոխարկիլն մեզանէ անգիտելի, բայց ի յայսմանէ, որ ի թվին փրկչին մերոյ Քրիստոսի 1775 քահանայ ոմն ի յազգէն Յայիոյ բնակօղ ի մայրաքաղաքն Թիփլիս գիտելով Անուանց օր իմոյ ի Անուն Սուլթնում, յամարելով ի միտս իւր, թէ նա իցէ մի ի սերնդոց Խօջա Նազարի, որ ոչ է այտպէս, քանզի շահ Աբաս արքայն Պարսից Խոջա Նազարին յանեալ ի գիօղաքաղաքէն Ջուղաու եւ նախնին յոր իմոյ յանիեալ ի Նախիջեվանոյ եւ տունն նախնու իմոյ ի Անուն Ազգաբանութեան Անուանի Շահամիրեանց: Կամ այլ որ ինչ մտածութիւնն, նորին սա գիրքս Թիփլիսու սիրով շնորհեաց մեզ ձեռամբն Յովսէփա Յարիրապետին Վրաց՝ առ ի վայելումն մեր եւ որդոց որդոց մերոց, որում վկա է գրեցեալն նորին որ առ մեզ Ապրելի ամսի 18 յամի փրկչին 1774: Եւ մեք սիրով ընկալաք եւ ընդունեցինք իփր շնորհայբաշխութիւնն ի նմանէ եւ խլեցաք նմայ ձեռամբն ասացեալ յարիրապետի եւ ընթերցաք ի նմանէ շնորհակալութիւնն մեզնէ:

Եվ յորպէս սա գանձս է, լավատի պատվական եւ ցանկութիւնն սրտի իմոյ, զի կալով մնացէ առ ի վայելումն սերնդոց Շահամիրեանց, այսպէս այժմոյս ունին Յովսէփոս եւ Յակոբոս որդիք Նազարուի, որդոյ Յակոբջանի, որդոյ Շհամրի, որդոյ Սուլթնումի, որդոյ Դաուրթխանի, որդոյ Շհամրի, որդոյ Մուրաջանի, որդոյ Շհամրի, մեծի Շհամրեանց սերնդէ եւ ի տանէն Նախիջեվանոյ, եւ ակն ունիմ ի Տեառնէ զի պահեսցէ. շնոհք եւ ողորմութիւն իւր ի վերա սերնդոց Շհամրեանց եւ ի վերա այս պատվական գանձիս, զի կալով անփութ մնացէ սա գանձս ի տան եւ ի բնակութեան Շհամրեանց ըստ արժանավորութեան պատվոյ իւրոյ մինչեւ ցրժամանակն կամաց Տեառն:

Վասն որոյ պատվիրեմ ձեզ սերնդոց Շհամրեանց, զի գիրքս ունիցիք ի տան եւ ի բնակութեան ձերում մաքուր տեղի, մի՛ վաճառեսցուք, մի՛ գրաւեսցուք եւ մի՛ փոխատուութեամբ տանէ ի դուրս տացուք վասն [ն]որոք սնոտի իրաց, քանզի ինձ յատկապէս թլեցաւ ծայրագուն պատճառ լինիլ ի սմա, քանզի միջոց իփր 173 ամ ժամանակէն մելլնաւ ձեռագրութեամբ անարատ մնացեալ մինչեւ ցրայսօր, որ տեսչողաց երեկի իփր այսօր լինի գրեցեալ, ուրեմն ոչ է դժվարին յազարաւոր ամօք այսպէս անարատ մնալոց, եթէ մեք ոչ անկանիմք ի սխալանս մեղաց, որում ակն ունիմ ի Տեառնէ, զի մեզ եւս փրկեսցէ եւ զերծուցէ ի ամենայն սխալանացէ եւ այլլն:

[Գր]եցաւ Մալքասումն, ի ափս օվկիանոսի, Յօգոստոսի ամսի 1, Յամի Տեառն փրկչին մերոյ 1796

Ի սմայ յանդիպողաց խոնարհ եւ փոքրիկ սպասաւոր (անընկալելի ստորագրութիւն):

ՅԻՇԱՏԱԿԱՐԱՆ ԳՐԶՈՒԹՅԱՆ ԺԱՄԱՆԱԿԻ

91բ (նկարի տակ) Զմեղաւոր Հայրապետ նկարողն յիշեցէ՛ք, ով մանկունք սուրբ եկեղեցոյ:

141բ (նկարի տակ) ԶՀայրապետ ծաղկողս յիշեցէ՛ք:

213բ (նկարի տակ) ԶՀայրապետ ծաղկողս յիշեցէ՛ք:

211բ Զմեղապարտ անարժան գրչակս յիշեցէ՛ք:

262բ [Փ]առք անըսկիզբն անեղ անե՞զր իսկև///(չգրուած)ականին Հոգւոյդ քում էակցին, անճառ բղմանն հայրենի, մի բնութեանդ աստուածային մի տէրութեանդ եւ միշտ էին, կատարեալ երից անձինդ կատարողի արարածին, փառք պատիւ եւ զօրութիւն, եւ բարձրագոյն իշխանութիւն, յանցեալն յայժմուս յապագային եւ անըսպառ յաւիտենին ի ամէն: [Ո]ր ետ կարողութիւն տկար մարմնոյս հասանել ի վերջ տառիս այս մարգարտաշար եւ վարդափթիթ բուրաստանիս, որ է սա ընդիր օրինակէ: Որ եւ գրեցաւ սա ի յերկիրս Ասպահան, ի յեզր Նարնդալային որ ասի Թորսկան, ձեռամբ ոգնամեղ անարժան Գասպար իրիցի, որ եւ զանունս իմ եւ զգործս ոչ յիշեցէ՛ք ի յերկնաբացիք յաղօթս ձեր զեղկելի գրողս, զի բազում աշխատութեամբ գրեցի զսայ, Աստուծոյ զօրութեամբն ի յաւարտ հասի: Աղաչեմ ըզձեզ, ով մանկունք սուրբ եկեղեցւոյ, կարգացողք եւ լսողք, ամենքն մի բերան ողորմի ասացէ՛ք, զի եւ զձեզ լիցի ողորմութիւն ի Քրիստոսէ Աստուծոյ մերոյ. ամէն: |263ա| Գրուեցաւ ի թուականիս մեր ՌՃԼԵ. (1686) եւ ի թագաւորութեան մերոյ շահ Սուլեմանին, եւ ի հայրապետութեանն տեառն Եղիազարու, որ այսմ ամի նըստաւ ի յաթոռ հայկազան սեռիս՝ ի Սուրբն Էջմիածին, որ եւ Աստուած եւ անսասան պահեսցէ ի յայլագագաց, եւ ի առաջնորդութեան տեառն Յոհաննու արհեպիսկոպոսի, որ եմք ի ներքոյ հարկի նոցա՝ ի վիշտ եւ ի նեղութիւն, ազատարարն Քրիստոս ազատեսցէ զամէն հաւատացեալ քրիստենեայնս յերեւելի եւ յաներեւոյթ թըշնամուոյն:

[Ո]ւտի եւ տեսել ըզսորա անճառ փրկագործութեան խորհուրդ, ոմն Եղսաբերք անուն, զոր ի վաղուց հետէ ցանկայր աստուածախօս այսմ մարգարտաշար լուսափթիթ սուրբ Աւետարանիս, որ ըստացաւ բարի յիշատակ հոգւոյ իւրոյ եւ ծնօղաց իւրոց, ի միտ առեալ զբանն Եսայեայ որ ասէ՛ Երանի, որ ունիցի զաւակ ի Սիոն եւ ընտանիք յերուսաղեմ. վասն այն յուոյն ստացաւ զսուրբ Աւետարանս զարդարեալ եւ ոսկե|263բ|ղենօք ծաղկօք՝ յիշատակ իւրն եւ իւր ծնօղացն, յիշեցէ՛ք եւ Աստուած ողորմի ասացէ՛ք<ա>: Դարձեալ յիշեցէ՛ք ի Քրիստոս Եղսաբերքն եւ կողակիցն Խօջայ Յովանէսն եւ հանգուցեալ որդիքն՝ Մանուկն, Յեատին եւ Մնացականն, յիշեցէ՛ք եւ Աստուած ողորմի]: Դարձեալ յիշեցէ՛ք ի Քրիստոս Եղսաբերքն եւ ըզդըստերքըն՝ Վարթախաթունըն, Բէկումն եւ հանգուցեալ դըստերքըն՝ Խաթունն, Սիսիլէն, յիշեցէ՛ք. եւ միւսանգամ յիշեցէ՛ք ի Քրիստոս Եղսաբերքն եւ դուստրն Վարթախաթունն եւ սորա կողակիցն, որ է հանգուցեալ՝ Մուրախանն, եւ որդին՝ հանգուցեալ Սիմոնանն, եւ միւսն որդին՝ Յովասափն, զոր Տէր Աստուած ընդ երկայն աւուրս պահեսցէ. ամէն: Նաեւ զդստերքըն՝ Մարգարիտն եւ Յօղիղէն յիշեցէ՛ք, եւ կրկին անգամ յիշեցէ՛ք ի Քրիստոս Եղսաբերքն եւ միւս դուստր Բէկումն եւ կողակիցն՝ Գալուսան, եւ զդուստր Գուլջանն. զոր Տէր Աստուած ընդ երկայն աւուրս պահեսցէ. ամէն: Դարձեալ յիշեցէ՛ք ի Քրիստոս զԽօջայ Բաղդասարն եւ եղբայրն՝ Խօջայ Յովանէսն եւ որ|264ա|դիքն՝ զհանգուցեալ Սարգիսն, Յակոբջանն, Սահրատըն, եւ դըստերքըն՝ Մինախաթունն, Խանմաղէն. յիշեցէ՛ք եւ Աստուած ողորմի ասացէ՛ք. ամէն: Դարձեալ յիշեցէ՛ք ի Քրիստոս զԽօջայ Յովանէսն եւ զկողակիցն Եղսաբերքըն եւ սորա ծնօղքն՝ զՆիկողայոսն եւ զԽաթունըն յիշեցէ՛ք եւ Աստուած ողորմի ասացէ՛ք. ամէն:

265բ Ով հայրք եւ եղբայրք, աղաչեմ ըզձեզ՝ յորժամ հանդիպիք սմա կարգալով կամ օրինակելով սխալանաց եւ <եւ> խոշորանաց անմեղադիր լերո՛ւք, զի այս էր կար մեր: Յիշեցէ՛ք զմեղապարտ եւ անարժան փժոնն գրչակս՝ Գասպար քահանայիս եւ զվարպետն իմ՝ Յովանէս դպիրն, որ է հանգուցեալ առ Քրիստոս, եւ մէկ բերան ողորմի ասացէ՛ք. Ամէն. Հայր մեր:

ՅԻՇԱՏԱԿԱՐԱՆ ԳՐՉՈՒԹՅԱՆ ԺԱՄԱՆԱԿԻ

270բ ՈՍ Տէր իմ Յիսուս Քրիստո՛ս, յորժամ նստիս յաթոռ դատողական՝ հատուցանել մարդկան իւրաքանչիւր զգործս իւր, զոչ թողեալս ի դատաստան քո եւ զխլեալս յի|271ա|րաւանց քոց զնիկողայոս գրիչ, որ խրատեալս եմ վրճիւ տալով մեղաց իմոց բաւականացի ի մարդասիրէդ, զի ընդունիցիմ զարքայութիւնդ:

ՅԻՇԱՏԱԿԱՐԱՆ ՀԵՏԱԳԱՅԻ

553ա Յիշատակ է սուրբ Աւետարանիս արծա|[[թն³]] բօշա Սարգսիւն, կնոջն Սալչուկին, հօրն Մուրատին, մօրն Մարգարտին, որդոյն Սիմոնին, ///ռհանին, եղբօրն Պետրոսին: Եթէ ոք յիշէ զսոսա միով Հայր մեղայիւ, յիշեալ լիցի առաջի Քրիստոսի. ամէն, Հայր:

³ Ձնջուած տառակապակցութիւն է. հազիւ նշմարելի՝ «թն», որ նկատուում է «արծաթն» բառը եւ հաւանաբար առնչուում է նեոագրի արծաթէ թիթեղակազմերի վարպետի անուան հետ:

ՅԻՇԱՏԱԿԱՐԱՆ ՀԵՏԱԳԱՅԻ

*2ա Յիշատակ է Սուրբ Խաչո Օվանէսին եւ կողակից Նիգար խաթունին, թվականին ՌՄԿԹ.
(1820, թուականի մօտ նոյն սեւ թանաքով նկարուած է փոքրիկ, հաւասարաթեւ, բոլորակ խաչ):*

Appendix E

(Chapter 4)

Armenian Cochineal Recipes Schemes of the Preparation Process

Appendix F

(Chapter 4)

Armenian Cochineal Recipes

Transcription, Translation, Glossary, and Measure Units

Ten historical recipes of cochineal colorants retrieved from Armenian manuscripts¹
(Armenian transcription and English translation)

1	<p>ՄՄ 3189, թ. 25ա, Ժողովածու, 1627-1631 որթ, չօղան, լուրթր, շիպ, ջուր, սամղ</p>	<p>MS 3189, f. 25r, Miscellanea, 1627-1631 cochineal, soapwort, lodhra, alum, water, gum</p>
	<p><i>Խրատ վասն որթան</i></p> <p>Նախ առ որթ, չօղան, լուրթր, շիպ, ամենն սղրքէ, չօղանն մի սղրքէր, որիշ-որիշ սղրքէ գաստ ի չողանէն, ապա յորժամ ջուրն ածես ծանիր որ Զ [6] դրամ որթանն Ա [1] նուկի ջուր ամ: Յառաջն ջուրն դիր պուտկով ի վերայ կրակին որ եռա, ապա մէկ դրամ որթանն մէկ պըտղունց չօղան ձգէ, դիր որ եռայ, ապա վայր առ, ջուրն քամէ, դարձեալ դիր ի վերայ կրակին որ եռ մի գա ու որթն ձգէ խառնէ, քանի դրամ որթն է այնչափ պըտղունց լուրթր ձգէ, այնչափ պըտղունց այլ շիպ ձգէ, խառնէ, ապա թէ լա դալպանտով քամէ, ապիկի ամանով դիր որ չորնայ, բայց ի չորացնելն դոլպանտ շորով ծածկէ, որ չթօգոտի, յորժամ բանացնես սամղ ամ ու գրէ, յայտ է:</p>	<p><i>Advice on cochineal</i></p> <p>First, take cochineal, soapwort, lodhra, and alum, and grind all of it, do not grind the soapwort, grind the others despite the soapwort, then, when you pour the water, measure 1 <i>nuki</i> of water for 6 <i>dram</i> of cochineal. First, put the water with crock on the heat to boil, then, add 1 pinch of soapwort for [each] 1 dram of cochineal, put to boil, then take it off, strain the water, put again on the heat to boil once, and add the cochineal, mix. Add as many pinches of lodhra and alum as many are the drams of cochineal, mix. Then, strain well with fine cotton cloth, and put in a glass container to dry. But while drying, cover it with fine cotton cloth, so that it will not get dust. When you want to use, add gum, and write, that is it.</p>
2	<p>ՄՄ 7322, թ. 1ա, Արուեստաբանութիւն (Քիմիա), 1694 ղըրմըզ, ջուր, չօղան, լուրթր, շիպ</p>	<p>MS 7322, f. 1r, Book of Arts (Chemistry), 1694 cochineal, water, soapwort, lodhra, alum</p>
	<p><i>Ղըրմըզ եփել</i></p> <p>Ղըրմըզ Ե [5] տրամ ծեծեալ հավանով, որ լինի որպէս փոշի, լից ի թուխտն և հազր պահէ, և առ նոր կլայեկած թէնճիրա, ապա [կա՛մ] նոր կլայեկել տաս և լից Է [7] նուկի ջուր, որ է Գ [3] հոխայ ու կէս և Է [7] տրամ չօղան լից այտ ջուրտ և եփեալ լա, որ լինի դեղին ջուր մի և Ա [1] նուկի ջուրն հատնի ի յեփելն, լավ սերտ կտաւով քնամեա ուրիշ ամանի մէջ որ չօղանն չի ելանէ և դարձեալ արկ ի թէնճիրան գայդ ջուրդ և դիր ի կրակն որ եփ գայ, և գայն ծեծած դրմըզն լից ի մէջն, և լինի որպէս արիւն, և այնքան եփեայ որ մէկ նուկի ջուրն ևս հատնի և առ և առ [կրկ.]</p>	<p><i>Cooking cochineal</i></p> <p>Grind in a mortar 5 <i>dram</i> of cochineal to make it like powder and keep it on paper to have it ready. Take a new tinned copper pot, then [or?], tin it again, and pour 7 <i>nuki</i> of water, that is 3 <i>oxay</i> and a half, and add to that water 7 <i>dram</i> of soapwort and cook well so that water becomes yellow and 1 <i>nuki</i> of water evaporates. Strain with a good dense cloth into another pot so that soapwort does not come out and pour that water into the copper pot again and put on heat to cook. And add to it the ground cochineal, it will be like blood, and cook until 1 <i>nuki</i> of water also evaporates. And take the</p>

¹ In both Armenian and English versions, the additions made by us are taken in square brackets. Question marks next to the words indicate the supposed transcription and translation due to illegible or uncertain text in the source manuscript. The number, name, and date of each manuscript, and the key-ingredients of each recipe are given in the upper two lines, then follows the text of the recipe. Glossary is given at the end, to facilitate the understanding of technical terms.

լուրթ և մանտր ծեծեալ պատրաստի պահէ, և եփիլ դրմբզին առ Բ [2] մատամբդ ի լուրթբէտ և լից ի մէջ դրմբզին, և արկ կաթ մի ի ձուի վերայ և տես զգոյնն թէ շէկէ, թէ լաւ [Է՞], թէ շէկէ [շա՛տ] կրկին ձգեալ լուրթ և մինչ Գ [3] անգամ ձգեալ, փորձելով և թէ զգոյնն եգիտ բարութէ, ապա թէ ոչ, մէկ պողոնց ծեծեալ շիպ ձգեա, շատ չի ձգես, սև կանէ, զի սևութիւնն ի շպէն կու գոյեանայ, և գայս սոսիկ արկ ի յայն սերտ կտան և լաւ քամեա, քիչ մի պաղեցուր և ի ֆարֆուրի ամանի մէջն քամեա և ի վերան տախտկով ծածկէ և դիր ի շուքն Գ [3] օր անխաս մնայ և անշարժ, յետ Գ [3] ավուր, սունկերով առ սակաւ սակաւ որ տակն չի շարժի և ուրիշ չինի մէջ [ք]ամեա և տակի մնացեալն լաւն չէ, և լաւն քաշածտէ, ծածկէ գայդ տախտկով, ԺԲ [12] օր պահեալ ի շուքն, և յարևն կու սևացնէ, մի դրներ [արևի տակ], և խիստ լաւ է որ դիրամն Բ [2] ոսկի կու տան ու կա[ր]ծէ:

lodhra and crush finely keeping it ready. And while cooking the cochineal, take with two fingers from your lodhra and add to the cochineal. And drop into an egg and check the color, if it is 'yellowish', if [it is?] good. If it is [too?] 'yellowish', add again of lodhra, and add up to 3 times, checking the color if it is good. If not, add 1 pinch of ground alum. Do not add too much, it will turn black because the blackness originates from alum. And pour it into that dense cloth and strain it well, cool down a bit, and strain it into a porcelain pot, and cover the pot with a board and keep it in a shadow for 3 days without touching and moving. After 3 days take with sponge² little by little, without moving the bottom, and strain into another porcelain. And what remains in the bottom is not good, the good is what you have collected, cover it with the board, and keep [it] for 12 days in the shadow. The sun will blacken it, do not put [under the sun]. And [it is] very good, that [they] give and [it] costs 2 golds of *diram*.

3	ՄՄ 10853, թ. 173բ, Ժողովածու, 1786-1788	MS 10853, f. 173v, Miscellanea, 1786-1788
	չօղան, ջուր, որթ դրմզ, լուրթ	soapwort, water, cochineal, lodhra

Խրատ դրմզի եփելու

Երեք դրամ չօղան, երկու օխայ ջուր եփէ միատեղ, և յետ եփելուն քամէ զչօղանն, և որթ դրմզն խիստ մի մանտրեր, և կրկին չօղանի ջուրն դիր ի վերայ կրակին և լից ի մէջն զդրմզն, որ է ծածկագրություն [հինգ դրամ] և թող մինչև ծածկագրություն [երկու] եփ ելլէ, և յետ եփելոյն ծածկագրություն [երկու դրամ լուրթ] ծեծած լաւ բարակ ցանէ ի մէջն, որ ծածկագրություն [մեկ ե]փ ալ ելէ սախէն, շատ ծածկագրություն [չեփի], և վայր առ ի կրակէն և քամէ և զուտ ջուրն առ և տակուկն թափէ և դիր ջուրն ի մէջ մեծամեծ չանաղաց, որքան որ տանի, և թող մէկ օր անցանի և յետոյ կրկին քամէ, որ զուտ

Advice on the cooking of cochineal

Cook together 3 *dram* of soapwort and 2 *ōxay* of water and strain the soapwort after cooking. And grind finely the cochineal, heat again the water of soapwort, add the cochineal, that is cryptograph [5 *dram*] and leave until cryptograph [2] boils come out, and after boiling sprinkle inside cryptograph [2 *dram* of lodhra] finely ground, that [it] boils cryptograph [once] more in container,³ not to cryptograph [boil] too much. And take off the heat and strain. And take only the water and throw away the residue. And put the water into big

² *sunkēr*. Sponge, from Ottoman Turkish *sünger*, or Ancient Greek *σφουγγαρί* (*sphoungarí*). In Armenian: *spung* (Łazaryan, Avetisyan 2009:711; Łazaryan 2003, List 1:435).

³ *saxa*. Container, big basin, earthen, wooden, or copper, for cooking, eating, washing, or bathing. From Arabic *sakka* which means 'water carrier'. In Armenian: *sax* or *saxay* (Malxaseanc' 1945, Vol. 4, List 1:170; Acařean 1902:305; Acařean 1913:951).

	<p>ջրի նման լինի և քամելուն յետև սևագոյն տակուկ կու լինի, թափե և գուտ կարմիր ջուրն ի մէջ չանախին լից և դիր ի յարևն որ Ե [5] Չ [6] օր կենայ և յետ կենալոյն քամէ ջուրն և տեսանես տակն կարմրագոյն նստեալ է, առ զայն և կրկին թող ի յարևն, որ ջրի մէջն բան չի մնայ, և չօքեկն չորցուր:</p>	<p>bowls,⁴ as much as the capacity, leave for a day, then strain again so that it will be just like water. And after straining the black residue will remain, throw [it] and pour only the red water into a bowl and keep it under the sun for 5-6 days. And after [that], strain the water and you will see in the bottom the red residue, take it, and leave again under the sun, that nothing will remain in the water, and dry the four sides.</p>
4	<p>ՄՄ 3000, թ. 2ա, Արուեստաբանութիւն (Քիմիա), 18-րդ դ. դրմզ, չողան, չաթվար, լօթըր, ջուր</p>	<p>MS 3000, f. 2r, Book of Arts (Chemistry), 18th c. cochineal, soapwort, zedoary, lodhra, water</p>
	<p>[Խրատ] դրմզ եփելէ Առ 1 մսխալ դրմզ, մին մսխալ չողան, չաթվար, մսխալ լօթըր, 40 մսխալ ջուր: Ջուրն ածիր մին դազանի մէջ, չողանն գծիր մէջն, լաւ եփե, մինչի որ ջուրն լաւ դեղնի, յետոյ քամէ շորով, յետ դնիր () դազանն, ապայ դրմզն գծիր մէջն, սեւ գնի որ եփես ըռանկն (), յետոյ լօթըր գծիր մէջն դարարին [դազանի՞ն], եթէ սեւայ էլ գծիր լօթըր, մինչի լաւ յիստակվի կարմրի, բանացուր լեւ դրմզ կու դառնայ:</p>	<p>[Advice] on the cooking of cochineal⁵ Take 1 <i>msxal</i> of cochineal,⁶ 1 <i>msxal</i> of soapwort,⁷ zedoary,⁸ lodhra,⁹ and 40 <i>msxal</i> of water. Pour water into the pot,¹⁰ add soapwort, and cook well until the water becomes yellow. Then strain with cloth, put (?) back into the pot, and add cochineal. The hue (?) will be black when you cook. Then add lodhra in the pot (?), if it is black, add more lodhra, until it clears well, and turns red. Use it, it will be a good cochineal.</p>
5	<p>ՄՄ 7715, թ. 85բ, Ժողովածու, 18-րդ դ. դրմզ, ջուր, չողան, լութըր, շիպ</p>	<p>MS 7715, f. 85v, Miscellanea, 18th c. cochineal, water, soapwort, lodhra, alum</p>
	<p>Խրատ վասն դրմզ եփելու Առ Ե [5] տրամ դրմզ, մանսոր սղկէ, լից ի գելուն պուտուկի մէջն, վերան լից ԳՃ [300] տրամ ջուր և</p>	<p>Advice on the cooking of cochineal Take 5 <i>dram</i> of cochineal, grind finely, put into a smooth crock, add 300 <i>dram</i> of water, and cook.</p>

⁴ *c'anał*. Bowl, deep plate, flat clay pot with a large mouth, from Turkish *canak*. In Armenian: *c'anax* (Łazaryan, Avetisyan 2009:624; Malxaseanc' 1945, Vol. 4, List 1:9).

⁵ The recipes start with the generalized phrase '*on the cooking of cochineal*', without specification if it is a dye, pigment, or ink, or reference to its color. However, by following the text, it is possible to understand the purpose of the recipe, that is for writing or painting. We conclude that '*on the cooking of cochineal*' in the context of those texts implicates the manufacturing process of red colorant to be used in writing or painting.

⁶ *İrmz* or *İarməz*. The name for cochineal in Armenian texts influenced by Turkish *kırmızı* or Persian and Arabic *g'ermez*, *g'irmiz*, meaning '*red*' (Łazaryan, Avetisyan 2009:465). In Armenian: *ordan karmir*/*vordan karmir*.

⁷ *c'olan*. The name for the plant soapwort or *Saponaria officinalis* L., which has been frequently used in Armenian cochineal recipes. In the presented ones it appears as *c'olan* or *c'olan*, similar to Turkish name *çog'en*. In Armenian: *ōc'araxot* (Bedevian 2006:530a).

⁸ *c'at'var*. Zedoary is mentioned only in one recipe among the presented ones. It refers to *Curcuma zedoaria* Rosc. and has parallels with Arabic *gadwâr/zadwâr* and Turkish *çevdar*. In Armenian: *catvar* (Bedevian 2006:217b).

⁹ *lot'ar*. This name appears also as *lot'r*, *lut'r*, *lurt'r*, *lut'ur*. It has been identified as *lodhra* or *Lodh tree*, *Symplocos racemosa* Roxb. The only linguistic parallel to it is the *lûtr* in Arabic. Lodhra is mentioned almost in all the presented recipes of cochineal. In Armenian: *hwseneak*, *lōt'uri* (Bedevian 2006:573b).

¹⁰ *łazan*. Pot or cauldron, from Turkish word *kazan*. In Armenian: *kat'sa* (Łazaryan, Avetisyan 2009:451).

	<p>եփե, կէս տրամ չօղան լից մէջն, և Ա [1] դանկ լուծոն լաւ ծեծե, լից մէջն, սակաւ մի այլ շիպ լից, յետոյ հաւկթի վերայ գոյնն փորձե մինչ որ քեզ հանելի լինի, յետոյ բարակ այծի մաղով քամե, լից ապակի քասայի մէջն, դիր ի շուք տեղն Գ [3] օր մնայ, սունկարով մին փոքր երեսէն առ, ուրիշ տեղ քամե այն երեսէն քաշածո, այլ կերպ լալիե (), միջի դաթն այվի () սունկարով քաշե և լից ուրիշ քասայի մէջ որ է պատաշխի () դրմզ, տակի մնացածն թող այն քասայի մէջն մնայ չորանայ բան տուր:</p>	<p>Add 0,5 <i>dram</i> of soapwort and crush well 1 <i>dank</i> of lodhra and add to it, add a little alum. Then check the color on the egg until it will be pleasant to you. Then strain with a thin goat sieve, pour into a glass bowl, and keep in the shadow for 3 days. Take a little from the surface with a sponge and strain it into another place, [it ?] is different red, take the inner <i>ghat</i>(?)¹¹ with <i>ayvi</i>(?)¹² sponge and pour into another bowl,¹³ that is <i>patašxi</i> (?)¹⁴ cochineal. Leave the remaining part in the bottom of that bowl to dry and use.</p>
6	<p>ՄՄ 10978, թթ. 88ա-89բ, Հէքիմարան, 18-րդ դ. դրմզ, ջուր, չօղան, լօթուրն, շապ</p>	<p>MS 10978, ff. 88r-89v, Book of Medicine, 18th c. cochineal, water, soapwort, lodhra, alum</p>
	<p><i>Խորատ դրմզ եփելոյ, այսպէս սրայ.</i> Առ Ե [5] դրամ դրմզ, լաւ ծեծե ի հաւանն, Ը [8] նուկի յստակ ջուր լից ի նոր կլայեկած թանջարան մի, Գ [3] դրամ չօղան ծեծե, լից ի մէջն եփե, որ մնայ կէս լիտր, լից սերտ սպիտակ կտաւի մէջն, տաք-տաք քամե, որ մրուր չէրթայ հետն, և գայն ջուր թող օր և գիշեր մի, որ ըռաւաղի, գերեսի յստակ ջուրն առ և լից ի թանջարան և վառե [կրակ], որ եփե ջուրն, և դրմզն ջգե ի մէջն և խառնե չափաւոր, եփե, լինի որպէս արիւն, և հաւկիթիմ վերայ փորձե, լօթուրն բարակ ծեծե և պտղուց մի ձգե ի մէջն և փորձե, թե՛ գոյն բացե, մէկ պտղուց մի էլ ձգե, մինչ որ գոյն առնե, և ապա պտղուց մի շապ ձգե, շատ չի ձգես որ սևագոյն գայ, և մսխալի կտաւով քամե չինի ամանի մէջն, գերեսն թղթով ծածկե և թող Դ [4] կամ Ե [5] օր մնայ, որ լաւ ըռաւաղի, և դարձեալ երեսէն լաւ սունկարով եաւաշ քաշե և քամե այլ ուրիշ ամանի մէջ, զի մնացած լաւ չէ, և գայն քաշածի բերան ծածկե և Ի [20] օր շուք տեղ պահե, որ ըռաւաղի, և դարձեալ սունկարով ևս քաշե գերեսի ջուրն, և այն մնացածն իսիստ լաւ դրմզե, որ դրամ մէկ ոսկի աժե, և յետին</p>	<p><i>Advice on the cooking of cochineal, make like this:</i> Take 5 <i>dram</i> of cochineal, and grind well in a mortar. Pour 8 <i>nuki</i> of water into a new tinned copper pot, add into it 3 <i>dram</i> of ground soapwort, cook until half a liter remains, pour into dense white cloth, and strain while it is hot so that sediments should not pass through it. And leave that water for a day and a night to settle, take off the clear water from the surface and pour in the pot, and put on [the heat] to cook the water, add cochineal into it and stir moderately, cook, [it] will be as blood. And try on the egg. Finely grind the lodhra, add a pinch to it [to cochineal], and try. If the color is light, add one more pinch, until it gets its color. Then add a pinch of alum, do not add too much to not blacken it. And strain with a dense cloth into a porcelain container, cover the top with paper, and leave for 4-5 days to settle well. And again, skim off the surface [water] with a sponge and strain into another container, as the remaining part is not good. And cover the top of the strained</p>

¹¹ *ghat*. Maybe a dialectal *fat* in Armenian, probably of Turkish influence, that means 'fold' or 'layer' (Language Institute 2002, Vol. 3:344).

¹² *ayvi*. Uncertain word. We could neither translate nor find a close reference. Probably from Turkish or misspelled, as common for the Armenian texts of the historical period of Ottoman-Safavid rule (16th-19th-centuries).

¹³ *k'asa*. Flat vessel or bowl with narrow bottom and large mouth, for food or water. From Persian *kāse* or *kāsa* (Łazaryan, Avetisyan 2009:803; Language Institute 2002, Vol. 7:111).

¹⁴ *patašxi*. Uncertain word.

	<p>մնացածն օրթայէ, և տակի մնացեալն լօքի բան կանէ:</p> <p>Դարձեալ. առ Ե [5] դրամ դրմզ, ԹՃ [900] դրամ ջուր, Գ [3] դրամ չօղան Ա [1] դանկմի լուրուր, Ա [1] դանկ շիպ, դարձեալ եփէ և քամէ, ըստ կարգի խրատին, այս է:</p>	<p>one and keep it in the shadow for 20 days to settle. And again, skim off the surface water with a sponge, and the remaining part is a very good cochineal that costs one gold <i>dram</i>. And the rest is medium [quality], and the one left in the bottom is to use with lac.</p> <p>Again, take 5 <i>dram</i> of cochineal, 900 <i>dram</i> of water, 3 <i>dram</i> of soapwort, 1 <i>dank</i> of lodhra, and 1 <i>dank</i> of alum, cook again and strain, according to advice, that is it.</p>
<p>7</p>	<p>ՄՄ 11128, թթ. 107բ-108ա, Ժողովածու, 18-րդ դ. դրմզ, չօղան, լուր, շիպ, ջուր, գամիս</p> <p><i>Դրմզ եփելոյ խրատն այս է.</i></p> <p>Առ Ե [5] դրամ դրմզ, Գ [3] դրամ չօղան, կէս դրամ լուր, կէս դրամ շիպ, ՉՃ (600) դրամ ջուր: Նախ ջուրն անգամ Ա [1] կրակով եփէ որ քաֆն գայ, ապա լից մէջն և չօղանն և Ե [5] անգամ եռացո, այսինքն եփէ, ապա առ սերտ կտաւով քամէ և ապա ի ներս լից և որդն և դիր կրակին և Գ [3] անգամ եփէ, այսինքն եռոցո, և ապա ձգէ ի ներս և լուրն, որ Ա [1] անգամ եփվի, ապա առ ի կրակէն որ փոքր ինչ սառի, ձգէ ի ներս և շիպն և խառնէ և սերտ կտաւով կրկին քամէ և ի մէջ չինի կամ ապակեայ ամանոջ լից և երեսին Ա [1] տախտակ կամ թուղթ և թամուզ շէյ (՞) և գատ դիր վրէն, որ մէջն գատ չթափի և պարգի, ապա յիստակ կտաւով քաշէ մեղմ և կամաց-կամաց, որ տակն չշարժի և այնքան առ զջուրն, որ մնայ տակի թանձրն, և ապա երեսին տախտակ կամ թուղթ դիր, կապէ այն թանձր բաժինն և դիր յարևն որ չորանայ, ապա դանակով կամ այլ իրօք քերէ և սակաւ ինչ գամիտով գործ ածայ:</p>	<p>MS 11128, ff. 107v-108r, Miscellanea, 18th c. cochineal, soapwort, lodhra, alum, water, gum</p> <p><i>This is the advice for cooking cochineal:</i></p> <p>Take 5 <i>dram</i> of cochineal, 3 <i>dram</i> of soapwort, 0,5 <i>dram</i> of lodhra, 0,5 <i>dram</i> of alum, and 600 <i>dram</i> of water. First, cook the water one time to foam it, then add the soapwort and boil 5 times, that is to cook. Then strain with a dense cloth, then add cochineal and put on the heat, and cook 3 times, that is to boil. Then add the lodhra, cook [boil] once, then take off the heat, cool down a bit, add alum, stir, and strain again with a dense cloth and pour into a porcelain or glass container. Cover the top with board or paper and clean (?) and separate so that nothing enters inside and clears out. Then with a clean cloth take carefully and slowly [from the surface], without moving the bottom, and take that much water to leave the precipitate in the bottom, then cover it with board or paper, tie that precipitate and leave to dry under the sun. Then scratch with a knife or something else and use with a little gum.</p>
	<p>Նույն ձեռագիրը, թ. 192բ</p> <p>Դրմզի որդն ջրով խաշէ հան լից հողէ ամանով եղեալ կարմիր գինւոյ մէջն մնայ մէկ ամիս հան չորացո, այդ է մեռուցանելն դոմզի որդան:</p> <p>Բայց սորա եփել շինելն տես [107բ], այլ է մեռուցանել և այլ է շինել և կատարեալ եփելն և բանացնելոյ հասուցանելն գնա, որպէս ցուցաւ:</p>	<p>The same manuscript, f. 192v</p> <p>Boil the worm of cochineal with water, take out, pour into an earthen container with red wine, leave for a month, take out, and dry [it]. That is the way to kill the cochineal worm.</p>

But have a look at the cooking of it [107v]. Another thing is to kill, and other to make and perfectly cook, and to bring it to use, as shown.

8	ՄՄ 10645, թթ. 1ա-2բ, Բժշկարան, 1807 քուչինիլեա, լուրթ, չօղան, սպիտակ շիպ, գետի ջուր	MS 10645, ff. 1r-2v, Book of Medicine, 1807 cochineal, lodhra, soapwort, white alum, river water
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Յարագս քուչինիլայ եփելոյն յորդանէ
Առ քուչինիլեա 5 դրամ, լուրթ կէս դրամ, չօղան 3 դրամ, սպիտակ շիպ կէս դրամ, գետի ջուր պարզ 600 դրամ: Լուրթն և քուչինիլայն և շիպն ջոկ-ջոկ շարմադուն ծեծէ, և օր Ա [1] յառաջ յերեկոյեան ժամուն չօղանն ջրում դրջոց պահէ թասի մէջ մինչ ի յառաօտն, ապա եփեա այսպէս. 600 դրամ պարզ ջուրն նոր կլայեկած դազանով մարմանտ կրակով եփէ լաւ, ապա չօղանն իւր ջրովն ած նոյն դազանն և թող, որ Ե [5] անգամ եռն բարձրանայ լաւ եփ գայ, ապա վեր առ, լաւ սերտ կտաւով քամէ ջոկ ամանի մէջ, և դատարկացեալ դազանն լաւ լուա, և քամած չօղանին ջուրն լից կրկին նոյն դազանին մէջն և դիր կրակին, ապա առ գծեծած քուչիլայն, որ է քուչինիլայն, լից ի ներքս և թող եփ գայ, գդալին ծայրով անդադար խառնէ, ապա վեր առ կրակէն և թող, որ փոքր ինչ հովանայ և ապա լից ի ներսն գծեծած լուրթն և շիպն և փոքր ինչ խառնէ գդալով, ապա սերտ Բ [2] տակ բարակ կտաւով պարզ քամէ թամուզ յիստակ ապակեայ ամանի մէջ, թող մնայ Ե [5] և Չ [6] օր: Ապա պուտ Ա [1] սունգարով ջուրն վեր կալ, քամէ որիչ գաւաթի մէջ և գմնացեալն Գ [3] ամանում [երեք առանձին աման] սարապ և փասապ բռնէ (°) և արևն դնելովն ցամաքեցո, և օր ըստ օրէ ինչ որ գաւաթին Դ [4] կողմն կը մնայ, պիտի քերել և խառնել ի ներսն, որ շուտ չորանայ, ապա դանակով քերէ և գործ արկ: Նա ևս յորժամ ածես մէջ ամանին և տեսնես, որ սպիտակ փրփուր կանգնի գաւաթին երեսին, յայնժամ փրփուրն զլիսիցն քաշես լաւ կու լինի: Եւ այսպէս, առաջին երեսիցն քաշած ջուրն լաիլի բդուն (°) շինելոյն համար պէտք կու գայ,

On cooking k'uc'inilay [color] from vordan [cochineal]
Take 5 *dram* of cochineal, 0,5 *dram* of lodhra, 3 *dram* of soapwort, 0,5 *dram* of white alum, and 600 *dram* of clean river water. Grind finely and separately the lodhra, cochineal, and alum, and one day before, in the evening, keep soapwort soaked in a bowl with water until the morning. Then cook like this: cook well the 600 *dram* of clean water in the new tinned pot on slow heat, then add to it the soapwort with its water, and make it rise to the boiling point 5 times, cook well. Then take it off and strain it with a dense cloth into another container. And wash the empty pot well, add the strained water of soapwort into that same pot, and put on the heat. Then take the ground *k'uc'ilayn*, which is cochineal,¹⁵ add into it [the pot with water], and leave to cook. Stir with the tip of the spoon continuously, then take it off the heat and leave to cool down a bit. Then, add the ground lodhra and alum and stir a bit with a spoon. Then, strain with thin double-layered dense cloth into a clean glass container and leave for 5 and 6 days. Then, take a little of the water with a sponge, strain [it] into another bowl, and the rest in 3 containers [three separate containers] keep *sarap* and *p'asap* (?)¹⁶ and dry under the sun. And what remains in the 4 sides of the bowl should be scratched and added inside, day by day, to dry it fast, then scratch with a knife and use [it].

¹⁵ This recipe is interesting for introducing the term *k'u'inilay* instead of traditional *larmazor* or *ort'an*. Probably in this period (19th century) the fame of cochineal from the New World and its respective applications had enough circulation, in order to spread the name '*cochineal*' in the Old World.
¹⁶ *sarap* and *p'asap*. Uncertain words.

	իսկ մնացեալ Գ [3] բաժին քամածներն, առաջինն յոյժ պայծառ կու լինի, և միջինն ևս թուլագոյն, և վերջինն առաւել թուլագոյն:	Also, when you pour it into a bowl and see a white foam on its surface, it will be better to take off that foam. And so, the first water taken from the surface will be necessary for making <i>lahli bdun</i> (?), ¹⁷ and the rest 3 strained parts, [of these] the first will be very bright, the middle one [second] a bit weaker, and the last [third] weakest.
9	ՄՄ 7280, թթ. 145բ-146ա, Բժշկարան, 1812 դրմզ, լութուր, չղան, ջուր, շապ	MS 7280, ff. 145v-146r, Book of Medicine, 1812 cochineal, lodhra, soapwort, water, alum
	<i>Ղրմզ եփելն սյապէս արա, որ լինի լալի գոյն.</i> Առ Ժ [10] տրամ դրմզ և Ե [5] տրամ լութուր, Ե [5] տրամ չղան, զլութուրն և չղանն լից ի մէջ փախր ամանի կամ թանճարայի, և յօխայ և կէս ջրով եփէ, մինչև լութուրին և չղանին ուժն ելանէ, յետոյ քամէ, ջուրն առ և լից դարձեալ ի թանճարէն և դրմզն ծեծէ և լից այն քամած ջրոյդ մէջն և թող որ լաւ եփվի, մինչև որ եղնգանդ վերայ գրես իմանաս, որ լաւ եփած է, յետոյ լից չինի ամանի մէջ և շորով Ա [1] քամէ, դիր որ հանգչի և յետոյ քամէ առանց լաթի այլ չինի ամանի մէջ, այսպէս Դ [4]-Ե [5] հետ պարզն առ, զվերին ջուրն առած չորացո, պաղ[զ]ի (), մարդ կէս տրամ շապ կըծգէ մէջն, որ գոյնն պայծառ առնէ, զշապն, որ երբ կամիս ձգել, դրմզէն յառաջ ջրին մէջն ձգէ և ի ձգելն դրմզն շատ խառնէ, որ լաւ միաւորվի:	<i>Cook like this the cochineal, to make red color:</i> Take 10 <i>dram</i> of cochineal and 5 <i>dram</i> of lodhra, 5 <i>dram</i> of soapwort. Put the lodhra and soapwort into the copper pot, ¹⁸ and cook with 1,5 <i>ōxay</i> of water, until the strength of lodhra and soapwort comes out. Then strain, take the water, and pour again into a copper pot, grind the cochineal, and add into that strained water and cook well, until you write on your nail and see that it is well cooked. Then pour [it] into a porcelain container ¹⁹ and strain with a cloth once, leave to settle, then strain without cloth into another porcelain container. Clear up like this 4-5 times, dry the water taken from the surface, and cool (?). One should add 0,5 <i>dram</i> of alum to render the bright color. When you want to add the alum, add it into the water before the cochineal, and by adding the cochineal mix it a lot, to combine it well.
10	ՄՄ 4194, թ. 269բ, Ժողովածու, 19-րդ դ. ծաղիկ, լութր, չղան, ջուր, դրմզ, մեղր	MS 4194, f. 269v, Miscellanea, 19th c. flower, lodhra, soapwort, water, cochineal, honey
	<i>Վասն դրմզ շինելոյ</i> Առ մեկ դրամ ծաղիկ, մեկ դրամ լութր, Բ [2] դրամ չղան և մեկ նուկի ջուր, յառաջ չղանն ձգէ ի ջուրն, եռացուր, հետոյ բեր քամէ և ջուրն լից	<i>On making cochineal</i> Take 1 <i>dram</i> of flower, ²⁰ 1 <i>dram</i> of lodhra, 2 <i>dram</i> of soapwort, and 1 <i>nuki</i> of water. First, add soapwort into the water, boil, then, strain and pour

¹⁷ *lahli bdun*. Uncertain words.

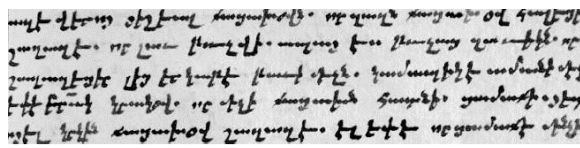
¹⁸ *t'an c'ara*. Copper pot or casserole, from Turkish *tenjere*. In Armenian: *phnje kat'sa, san* (Language Institute 2002, Vol.2:79; Acařean 1902:126).

¹⁹ *c'ini* or *c'ini aman*. Porcelain container, glazed ceramic from inside and outside, *c'ini* means 'Chinese', from Persian *cini*. In Armenian: *haxcapaki* (Malxaseanc' 1945, Vol. 4, List 1:23; Language Institute 2002:276).

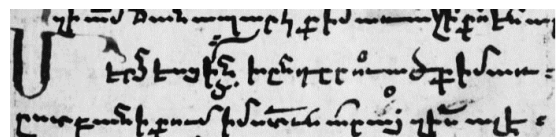
²⁰ *Flower* in this case is referred to as cochineal. Probably it was influenced by *çiçek* (= flower) or *çiçek boyası* (= flower paint) referred to as cochineal in the vernacular Turkish.

ստուկմ եռացուր, և գործուն սղկէ և լից չողանի ջրի մեջն թող մեկ եռ գայ վրէն, հետոյ սղ[կ]է զլութրն, և լից ի դրմզի մեջն խառնէ, և թոյլ տուր որ պաղի, հետոյ բեր բարակ շորով քամէ և թող որ Ժ [10], Գ [3] (°) օր մնայ, կամաց գերեսի ջուրն քաշէ յետ առ, և այն որ տակն կու մնայ այն է լա դրմզն, առ և պահէ և մեղորով բան տուր:

the water in a crock, boil it, and grind the cochineal, and add into the water soapwort, boil it once, then grind the lodhra and add to cochineal, mix, and leave to cool down. Then, strain with a thin cloth and leave for 10, 3 (?) days, carefully skim off the surface water, and what is left in the bottom is a good cochineal, take and keep, and use with honey.



Text fragment, f. 20r, Matenadaran MS 3000
(General Catalogue, Vol. 9, 2017:2145a).



Text fragment, Matenadaran MS 3189
(General Catalogue, Vol. 10, 2019:843a).

Glossary

	Armenian ²¹	Transliteration ²²	English
Ingredients	դրմզ/դըրմըզ	ḫrmz/ḫərməz	
	որթ	ort' (vort' /vord)	
	որթան	ort'an	cochineal
	քուչինիլա	k'uc'inila	
	ծաղիկ	caḡik	
	չոդան/չոդան	c'olan/c'ōlan	soapwort
	լօթըր/լօթըր	lot'r/lot'ər	
	լութըր	lut'r	
	լութըր	lurt'r	lodhra
	լութուր	lut'ur	
	շիպ	šip	
	շապ	šap	alum
	չաթվար	c'at'var	zedoary
	ջուր	jur	water
	սամդ	samḏ	gum
մեղր	meḗr	honey	
Utensils	աման	aman	container
	ապիկի աման	apiki aman	glass container
	ապակեայ աման	apakeay aman	
	չինի աման	c'ini aman	porcelain container
	Ֆարֆուրի աման	farfuri aman	porcelain container
	դազան	ḡazan	pot, cauldron
	թանճարա	t'anc'ara	copper pot
	կլայեկաձ թէնճիրա	klayekac t'ēnc'ira	tinned copper pot
	փախր աման	p'axr aman	copper pot
	պուտուկ	putuk	crook, pot
	թաս	t'as	bowl
	քասա	k'asa	bowl
	գաւաթ	gavat'	bowl, cup
	չանաղ	c'anaḡ	bowl, deep plate
	սախա	saxa	container, big basin
հավան	havan	mortar	
սունկեր	sunkēr	sponge	

²¹ Armenian names are given as they appear in the original text, without any alteration. They represent a variety of vernacular forms and sometimes misspellings.

²² We used the Hübschmann-Meillet system; A. Meillet and H. Hübschmann, *Altarmenisches Elementarbuch*, Heidelberg, 1913 (2nd edition, 1980).

	սունգար	sungar	
	սունկար	sunkar	
Measure units²³	դրամ	dram	dram, dirham, drachme
	մսխալ	msxal	mitkal, metkal
	նուկի	nuki	ounce, uncia, onza
	յօխայ/օխայ	ōxay	okha
	դանկ	dank	dank, dang
	պըստդունց	pəṭṭuncʻ	pinch
Preparation processes	եփե	epʻē	cook
	եռացուր	eřacʻur	boil
	սըրքե/սղկե	səṭkʻē/sṭkē	grind, crush
	ծեծե	cecē	grind, pound
	խառնե	xarñē	mix, stir
	դիր որ չորնայ	dir or cʻornay	put/let to dry
	թոյլ տուր որ պաղի	tʻuył tur or paḷi	let/leave to cool down
Filtering processes	դաւպանտով քամե	dolpantov kʻamē	strain with <i>dolpant</i> (fine cotton cloth)
	բարակ շորով քամե	barak šorov kʻamē	strain with thin cloth
	սերտ կտաւով քեամեա	sert ktavov kʻamea	strain with dense cloth/linen
	կամաց գերեսի ջուրն քաշե	kamacʻ zeresi ṭurn kʻašē	slowly skim off/take off the surface water
	սունգարով ջուրն վեր կալ	sungarov ṭurn ver kal	skim off the water with a <i>sungar</i> (sponge)
	սունկերով առ որ տակն չի շարժի	sunkērov ar or takn cʻi šarji	skim off with <i>sunkēr</i> (sponge) to not move the bottom
Ways to check the quality of ink/paint	եղնգանդ վերայ գրես իմանաս	eḷngand veray gres imanas	write on your nail to know
	արկ կաթ մի ի ձուի վերայ և տես զգոյնն	ark katʻ mi i jui veray ev tes zgoynn	drop into an egg and check/see the color

²³ Translation of measure units includes variations in English and not only. For the metrics, please see *Table F1*.

Table F.1. Comparative table of measure units based on different sources and interpretations. All quantities are represented in grams.

Name	Source A	Source B	Source C	Source D	Source E	Source F	Source G	Our adaptation
<i>dram</i>	2,942	3,3105	3,0884-3,148	3,824	3,8	3,4	3,2	3,4 g
<i>msxal</i>	4,414	4,414	4,412-4,497	--	4,0	4,26	--	4,3 g
<i>nuki</i>	26,484	26,484	33,105	30,594	25,1	320-1282	641	640 g*
<i>ōxay</i>	--	--	--	--	1230	1360	1282	1300 g
<i>dank</i>	0,09195	0,091959	--	--	0,566	0,09-0,75	--	0,5 g
big dank	0,735	0,735	--	--	--	--	--	

Our Adaptation

1 *dram* = 3,4 g

1 *msxal* = 4,3 g

1 *nuki* = 640 g

1 *ōxay* = 1300 g

1 *dank* = 0,5 g

Source A - According to Asar Sebastac'i (Armenian physician, 16-17th cc.), interpreted by K. Basmajian (Basmajian 1926:28-31).

Source B - According to Arabs (medieval period), interpreted by K. Basmajian (Basmajian 1926:28-31).

Source C - According to Arabs (medieval period), interpreted by S. Fani (Fani, 2013: 200, 203, 208).

Source D - By contemporary to 1920s standards used in medicine, suggested by K. Basmajian (Basmajian 1926:28-31).

Source E - By contemporary to 1980s standards, suggested by X. Galfayan (Galfayan 1983:85).

Source F - According to the Armenian dictionary by A. Malxaseanc' suggesting the contemporary to 1940s standards and explaining the historical ones (Malxaseanc' 1944, Vol. 1, List 1:542, 485, 486, Vol. 3, List 1:370, 484, 603, 125).

Source G - According to the interpretation of A. Harutyunyan (Harutyunyan 1941:80-81, 85).

* We adopted a version of 640 g instead of other versions, after rationalizing it through our recipe formulations and other sources that interpret the measuring unit "*nuki*" from a different perspective. Harut'yunyan mentions that "*nuki*" in the Armenian context corresponds to 641 g (Harut'yunyan 1941:80-81), Rebstock mentions that in the Ottoman context two "*nügi*" correspond to one "*okka*" (Rebstock 2008:2261) which is in accordance with our adaptation. "*Nuki*" is commonly associated with "*unki*" which corresponds to "*uncia*" (Latin) or "*ounkia*" (Greek) with values roughly ranging between 25-33 grams, but in the local context "*nuki*" was used as a weight unit with varying values in different Armenian regions, ranging between 320-1282 grams.

Bibliography

Primary sources

- Armenian manuscripts of Matenadaran collection (Mesrop Maštoc 'Institute of Ancient Manuscripts)
- MS 3000, *Book of Arts (Chemistry)* (Arvestabanu'tyun (*K'imia*)), 18th c.
- MS 3189, *Miscellanea (J'olovacu)*, 1627-1631
- MS 4194, *Miscellanea (J'olovacu)*, 19th c.
- MS 7280, *Book of Medicine (Bjškaran)*, 1812
- MS 7322, *Book of Arts (Chemistry)* (Arvestabanu'tyun (*K'imia*)), 1694
- MS 7715, *Miscellanea (J'olovacu)*, 18th c.
- MS 10645, *Book of Medicine (Bjškaran)*, 1807
- MS 10853, *Miscellanea (J'olovacu)*, 1786-1788
- MS 10978, *Book of Medicine (Hëk'imaran)*, 18th c.
- MS 11128, *Miscellanea (J'olovacu)*, 18th c.

Manuscript Catalogues

- Malxasyan A., *Catalogue of Manuscripts of The Maštoc' Matenadaran (C'uc'ak jeragrac' Maštoc'i anvan Matenadaran)*, Ter-Step'anyan A. (ed.), Vol. 3, Erewan 2007.
- Ter-Vardanyan G. (ed.), *General Catalogue of Armenian Manuscripts of The Maštoc' Matenadaran (Mayr C'uc'ak hayeren jeragrac' Maštoc'i anvan Matenadaran)*, Vol. 9, Erewan 2017.
- Ter-Vardanyan G. (ed.), *General Catalogue of Armenian Manuscripts of The Maštoc' Matenadaran (Mayr C'uc'ak hayeren jeragrac' Maštoc'i anvan Matenadaran)*, Vol. 10, Erewan 2019.
- Eganyan O., Zeyt'ownyan A., Ant'abyan P., *Catalogue of Manuscripts of The Maštoc' Matenadaran (C'uc'ak jeragrac' Maštoc'i anvan Matenadaran)*, Xaç'ikyan L., A. Mnaç'akanyan A. (eds.), Vol. 1, Erewan 1965.
- Eganyan O., Zeyt'ownyan A., Ant'abyan P., *Catalogue of Manuscripts of The Maštoc' Matenadaran (C'uc'ak jeragrac' Maštoc'i anvan Matenadaran)*, Xaç'ikyan L., A. Mnaç'akanyan A. (eds.), Vol. 2, Erewan 1970.

Dictionaries

- Acařean H., *Words Borrowed from Turkish in the Armenian Vernacular of Constantinople in Comparison with the Dialects of Van, Karabakh and Nor-Nakhichevan (T'urk'erëne p'oxaëal bařerë Pölsi hay j'olovrdakan lezuin meř hamematu'eamb Vani, Łarabali ev Nor-Naxiřevani barbařnerun)*, Lazarev Institute of Oriental Languages, Moscow-Vařarřapat 1902.
- Acařean H., *Provincial Armenian Dictionary (Hayeren gavařakan bařaran)*, Lazarev Institute of Oriental Languages, Tbilisi 1913.
- Bedevian A., *Illustrated Polyglottic Dictionary of Plant Names in Latin, Arabic, Armenian, English, French, German, Italian and Turkish Languages*, Cairo 2006.
- Łazaryan R., *Turkish-Armenian Dictionary (T'urk'eren-hayeren bařaran)*, Mitk' (publisher), Erewan 2003.
- Language Institute after H. Acařean, *Dialectal Armenian Dictionary (Hayoc' lezvi barbařayin bařaran)*, National Academy of Sciences RA (publisher), Erewan 2002.
- Łazaryan R., Avetisyan H., *Middle Armenian Dictionary (Miřin hayereni bařaran)*, Erewan State University (publisher), Erewan 2009.
- Malxaseanc' St., *Explanatory Armenian Dictionary (Hayeren bac'atrankan bařaran)*, Armenian SSR State Publishing House, Erewan 1944.
- Malxaseanc' St., *Explanatory Armenian Dictionary (Hayeren bac'atrankan bařaran)*, Armenian SSR State Publishing House, Erewan 1945.
- WordReference English-Turkish Dictionary: <https://www.wordreference.com/>, accessed on 31.05.2021.

Other

- Basmajian K., *Amirdovlat' of Amasia: Useless for Ignoramuses or Dictionary of Medicinal Substances (Amirdovlat' Amasiac'i: Angitac' Anpët kam bařaran bjřskakan nwt'oc')*, Vienna 1926.
- Fani S., *Le Arti del Libro Secondo le Fonti Arabe Originali*, Doctoral Thesis, University of Naples *L'Orientale*, 2013.
- Galfayan X., *Obtaining Carmine Colorant from Ararat Cochineal (Poluchenie kraski karmin iz araratskoj koshenili)*, Moscow 1983.
- Rebstock U., *Weights and measures in Islam*. In: *Encyclopaedia of the History of Science, Technology, and Medicine in Non-Western Cultures*. H. Selin (ed.), Berlin, Springer, 2008.

Appendix G

(Chapter 5)

Painting Technique

Appendix G. Painting Technique

This appendix presents the details of the painting technique through photos obtained with a Leica microscope. The conservation condition of the colors is also discussed.

Please note that the manuscripts LA152 and LA193 have a modern numerical pagination, while LA216 and LA253 have a modern numerical foliation. Therefore, the macro images in this description are referenced to pagination numbers for LA152 and LA193 and foliation numbers for LA216 and LA253, abbreviated as p./pp. (page/s) and f./ff. (folio/s), respectively.

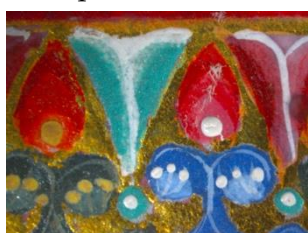
Appendix G.1. Bible LA 152

Constantinople/1623/Scribe: Hakob/Artist: Hakob (?)/Commissioner: Xoĵa Naz-ar/224 x 165 mm/606 folios/Script: bolorgir/Parchment/Inks, pigments, and gold/Leather binding

Appendix G.1.1. Painting Technique

The illuminations in this manuscript are uniform and seem to be the work of a single artist. The drawing lines and brushstrokes are smooth. The paint colors are brilliant and mostly well-preserved. The technique of applying the paint colors is reminiscent of the Byzantine examples, painted in opaque tones by creating layers, black contours, and white shades. Images have volumetry. Even the most minute details are perfectly accomplished.

Gold and saturated blues have uniform and thick appearances (pp. 13-14). Gold is applied to backgrounds, ornaments, and text. The ground preparation for the gold has a reddish hue (pp. 509, 784, 797, 799, 804, 1139). The ornamental illuminations (pp. 296, 1002) and majuscule letters in gold (pp. 407, 408, 950) were probably first drawn with red, and then painted.



p.8



p.8



p.13



p.13



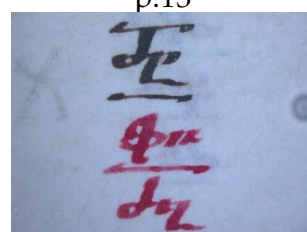
p.13



p.13



p.14



p.24



p.799



p.799



p.799



p.799

The writing ink is black; in some places, it tends to brown (pp. 2, 550, 750, 1139, 1210). Red, blue, and gold were also used for the majuscule letters. Orange-red and purplish-red are used as inks (p. 478).

Mountains and architecture have rigid lines, clear colors, and shades manipulated with white (pp. 137, 167, 241, 477, 487). Vestments are rendered with perfect folds and highlights (pp. 736, 819, 981).

White highlights and shades the ornaments, vestments, and architectural details.

Appendix G.1.2. Degradation Issues

This manuscript is in a good preservation state. However, degradation issues can be seen in some instances. Some of the colors used on the ornamental elements and the halos of figures on the margins of the folios are corroding the substrate, revealing the corrosion on the recto side. There is a loss of adhesion of the white lead paints and of the green colors from the support.

The detached pigments and gold can be seen on pp. 8, 13, 14, 76, 296, 487, 623, 627, 652, 685, 778, 795, 796, 877, 946, 982, 996, 1002, 1036, 1057, 1060, 1065, 1095, 1099, 1111, 1113, 1140; the blurred paint surface can be seen on pp. 352, 662, 992. Some detached pigments are transferred onto the facing folio visible on pp. 7, 464, 499, 661, 820, 898, 954, 960. There is a cut of the upper outer corner on p. 800.

On the leather binding, there are three punctures of missing pins on the outer face of each board and remnants of three leather fastenings on the inner face of the right board. The sewing of the lower part of the first gathering is weakened and slightly loose from the spine.



p.8



p.8



p.14



p.168

Appendix G.2. Gospel LA 216

New Julfa (Isfahan)/1686/Scribe: Gaspar/Artist: Hayrapet/Commissioner: Elsa-
bert'/108 x 079 mm/266 folios/Script: bolorgir/Parchment/Inks, pigments, and
gold/Leather binding with silver cover

Appendix G.2.1. Painting Technique

This artist's style is quite unique, probably due to their effort to render perfect images in a manuscript of such tiny dimensions. Here, the drawing lines and brushstrokes are thick and voluminous. The paint colors are bright and warm-toned, with abundant orange and yellow. Marginal flowers and ornated letters are probably drawn with light red and black (ff. 20r, 25v, 82r), and then painted. An organic-based carmine is extensively present in many details—for ground preparation, highlighting, shading, and mixing or layering with other colors to render different hues.

Gold is present on most miniature backgrounds, some ornaments, and text, seemingly with a reddish ground preparation (ff. 14v, 15v, 80r, 237v). The writing ink is black; in some folios, it tends to be brown (f. 58r). Red, blue, and gold are also used for the letters.

There are a few mountains in this manuscript (ff. 21r, 114v). The architecture is represented in tiny forms, mainly highlighted with bright pink (ff. 28v, 33r, 97v, 104v). Vestments are bright-colored, with folds marked in white, red, or orange (ff. 17r, 31r, 44v).

White highlights the flowers, vestments, and architectural details (ff. 88r, 91v, 141v). The green and orange are highlighted with yellow (ff. 97r, 189v).



f.11v



f.12r



f.143v



f.143v



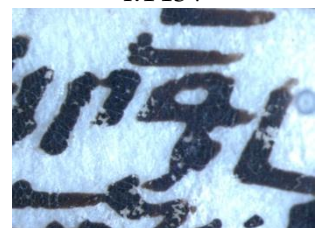
f.12r



f.12r



f.12r



f.2r



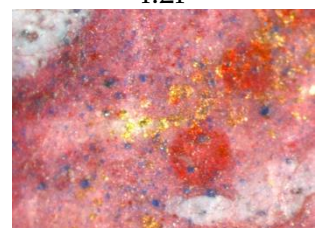
f.12r



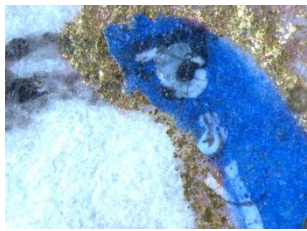
f.12r



f.22r



f.22v



f.12r



f.12r



f.12r



f.153r



f.153r



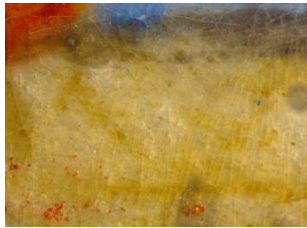
f.153r



f.213v



f.213v



f.143v



f.143



f.143v



f.150r



f.75v



f.153r



f.213v



f.213v



f.141v



f.141v



f.141v

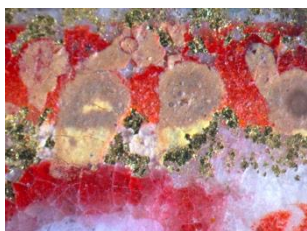
Appendix G.2.2. Degradation Issues

The manuscript is in a good preservation state; however, the parchment is discolored in some areas. There are several colors with detachment or with extensive micro-cracking. While white and orange colors do not show degradation, the yellow of orpiment is pale and sometimes appears dark. This phenomenon does not affect all the orpiment-based yellows analyzed. On some folios, the gold leaf shows an extensive loss.

Among the greens, some present a grainy texture, which could be due to the degradation of the yellow. However, further investigation should be carried out to confirm this hypothesis. The brown applied in the faces and hands displays a heterogeneous surface (as observed in the degradation of the minium in the Lorvão Beatus [39]), and in the figure portrayed in f. 193r, the edges of the white lead have darkened, which is an obvious sign of the degradation of this pigment. In addition, some of the pictorial layers are detaching from the support.

The detached pigments and gold can be seen in ff. 1v-8r, 12v-16v, 19r, 22v, 33r, 48r, 55v-56r, 75v, 122r, 142r, 153r, 154v, 155r, 193r, 213v, 218r, 256r; the faded ink in ff. 23r, 56r. Some loose pigments are transferred onto the facing folio visible in ff. 2r, 7v, 15v, 16r, 47v, 50r, 52r, 55v, 56r, 71v, 97r, 149r, 217v.

The sewing of the last gathering is weakened and slightly loose from the spine. The manuscript presents a silver treasure binding attached to the leather boards by metallic pins. The elaborate binding has an articulated metal spine and two clasps attached to the left board. The pins on the inner faces of the boards are corroded and transfer the greenish corrosion product to the parchment. The leather of the fore-edge flap is abraded.



f.2r



f.2r



f.12r



f.2r



f.193r



f.193r



f.193r



f.143v

Appendix G.3. Gospel LA 253

Constantinople (probably)/17th century/Scribe: unknown/Artist: unknown/Commissioner: unknown/154 x 114 mm/280 folios/Script: bolor-gir/Parchment/Inks, pigments, and gold/Leather binding

Appendix G.3.1. Painting Technique

The illuminations in this manuscript render a delicate artistic hand. The shades, highlights, and drawing lines in figures and ornaments are smooth and perfectly finished. The paint colors are warm-toned and mostly well-preserved. The rich palette, whether pure colors or mixtures, can be found throughout the manuscript.

Gold is used on the backgrounds of the miniatures, on some details, and on text, possibly laid on red-toned ground preparation (ff. 25v, 38v).

The writing ink is black and mostly homogenous. Orange and purplish reds, blue, and gold were also used for the letters (ff. 30v-32v, 93r). The Canon Tables and some unfinished figures at the end are drawn with purplish ink (ff. 19v, 21v).

The mountains have white backgrounds and shades, modeled with pale blue and grey (ff. 6r, 8r, 10v). The architectural details are highlighted and sometimes painted with white (ff. 7v, 9r, 10v). A striking variety of colors are used in the vestments (ff. 9r, 15v, 16r).

White is broadly applied for highlighting and shading. Dark green foliage is highlighted with lines and dots in yellow (ff.19v, 102r, 220r).



f.25v



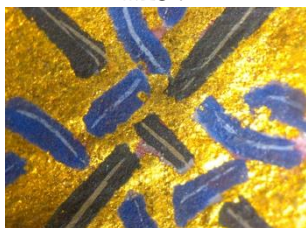
f.25v



f.25v



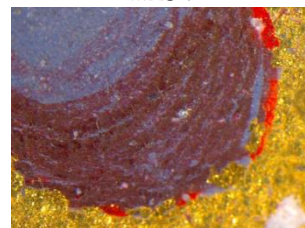
f.25v



f.25v



f.25v



f.25v



f.25v



f.25v



f.19v



f.234v



f.38v



f.234v



f.234v



f.234v



f.234v



f.7v



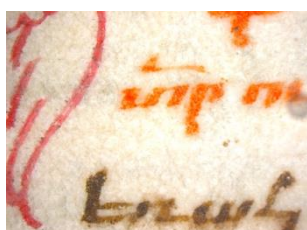
f.7v



f.7v



f.7v



f.277v



f.277v



f.277v



f.277v



f.277v



f.277v



f.277v



f.277v

Appendix G.3.2. Degradation Issues

In general, the manuscript is in a good preservation state, with some minor degradation issues. In some illuminations, there is possibly degradation of the orpiment and white lead. In marginalia areas, there are stains on the reverse side of the parchment. In the first folios and the final ones, the pictorial layer is detaching from the support. In the past decades, tissue papers were placed within the manuscript in an attempt to preserve the illumination; however, as they seem to cause the degradation and detachment of some paints, their removal should be considered in the near future.

Detached pigments and gold can be seen in ff. 5v, 7v, 9r, 11r, 12v, 14v, 15v, 28v-29r, 52v, 91v, 143v, 277r. Some detached pigments are transferred onto the facing folio visible in ff. 15r, 38v, 46v, 53r, 215r, 274v, 276v, and onto the paper endleaves probably placed posteriorly in-between the folios that can be seen within the ff. 11r, 12v, 16r, 23v, 26r, 28v, 29r, 220r, 220v.

The leather of the binding is abraded; the fore-edge flap is embrittled and folded inwards. The lining applied on the inside of the boards is fading. The tail-endband presents the broken core. The sewing of the first and last gatherings is weakened and slightly loose from the spine. Some parchment folios are stained. The lower outer corner of f. 1r and the upper outer corner of f. 280r are torn. The manuscript probably had silver plates in the past, nailed to the boards, because there are several punctures on the outer faces of both boards and a metallic remnant preserved on the outer tail-edge of the right board.



f.234v



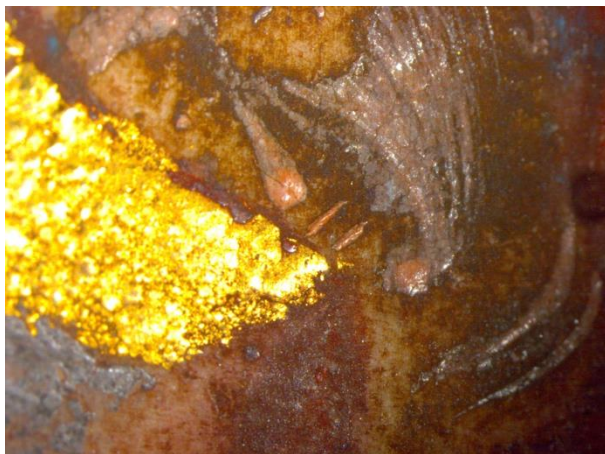
f.234v



f.234v



f.234v



f.5v



f.7v

Appendix G.4. Gospel LA 193

Crimea/17th century/Scribe: Nikolayos/Artist: Nikolayos/Commissioner: unknown/176 x 133 mm/277 folios/Script: bolorgir/Parchment/Inks, pigments, and gold/Leather binding with silver plates

Appendix G.4.1. Painting Technique

The illuminations are perfectly accomplished by the artist of this manuscript. Both figures and ornaments are executed with very fine textures and lines. The different tonalities of blue and organic reds are dominant.

Gold is used on the backgrounds, ornamental details, and text, likely applied on red-toned ground preparation.

The writing ink is black and mostly well-preserved. Gold, orange, and red are also used in the text.

The mountains are clearly outlined and layered in different colors (pp. 37, 40, 73). The architecture is highlighted and shaded with white. Vestments are mostly painted blue and purple.

Shades and highlights in figures, vestments, mountains, and architectural details are manipulated mostly with white.



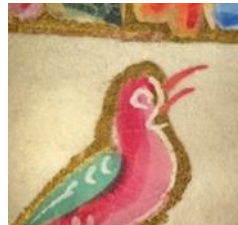
p.12



p.12



p.12



p.12



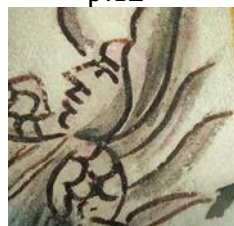
p.161



p.160



p.161



p.40



p.179



p.160

Appendix G.4.2. Degradation Issues

The manuscript is in sound condition. The colors are mostly well-preserved. Unlike the pictorial layers, parchment folios are discolored almost in the entire manuscript, with handling grime most often seen on the outer corners of the leaves resulting from the use of the Gospel in the past. The gatherings are tight within the binding. The leather used to cover the binding is abraded, especially on the spine. The metallic pins used to fix the silver plates on the outer face of the boards are corroded.

Appendix G.5.

Examples of the Application of Organic-Based Reds (Ranging from Pink to Carmine and Purple) As Outlines, Ground Layers, and Colors

LA 152, Bible, 1623, Constantinople



p.14



p.242



p.296



p.1189

LA 193, Gospel, 17th century, Crimea



p.244



p.132



p.150



p.326

LA 216, Gospel, 1686, Isfahan/New Julfa



f.20r



f.53r



f.105r



f.82r

LA 253, Gospel, 17th century, Constantinople



f.52v



f.277v



f.277v



f.138v



f.199r

Appendix G.6.

Book of Hours, an Example of Application of Color in Very Small Figures

Manuscript 23 is a book of hours from the Boufflers family. The original text block of this manuscript dates from 1410 to 1430, and the folios that were added later were from the 17th century. At present, this manuscript measures 200x 150 x 40 mm, and it is composed of 129 folios with 16 lines of text, written in Latin and French. For more information consult [52]. It is in the collection of Mafra National Palace | Palácio Nacional de Mafra (PNM).

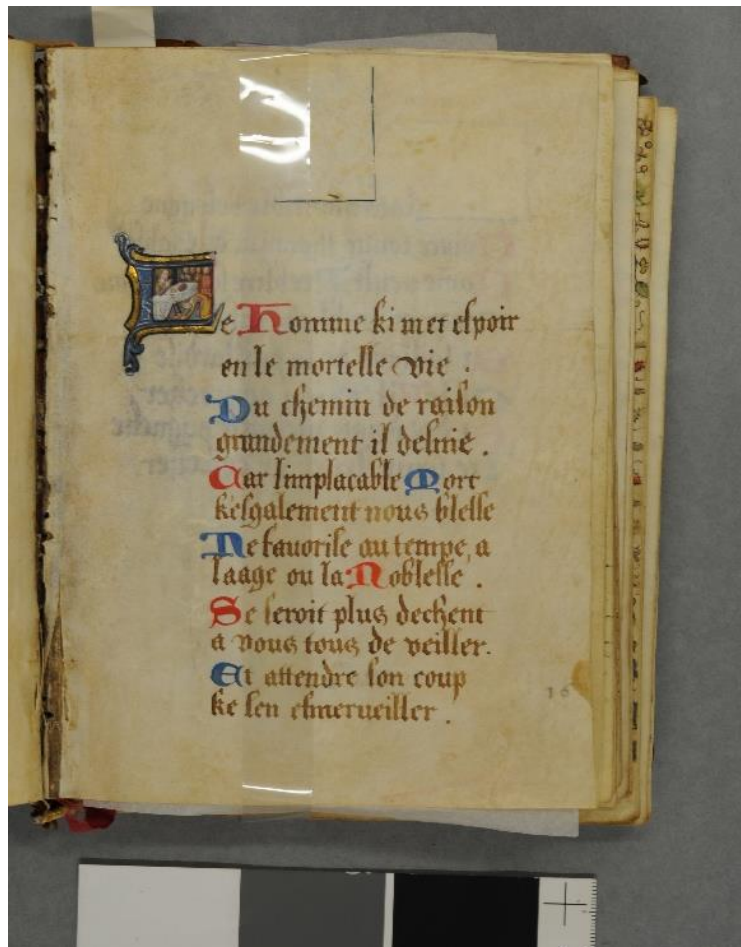


Figure G1. Manuscript 23 (1410-1430), f.16 (before intervention).
Mafra National Palace collection.



Figure G2. Manuscript 23 (1410-1430), f.16. PNM collection. Details obtained with Leica microscope.

Appendix H

(Chapter 5)

Areas of Analysis

Appendix H. Folios and Areas of Analysis¹

Areas of analysis for FORS (○), Raman (●), X-ray fluorescence (●), μ -sampling (●).



Figure H1. Bible LA 152, pages 13 and 14, © Gulbenkian Museum.

¹ Author is deeply thankful to Dr. Paula Nabais for the images with areas of analysis.

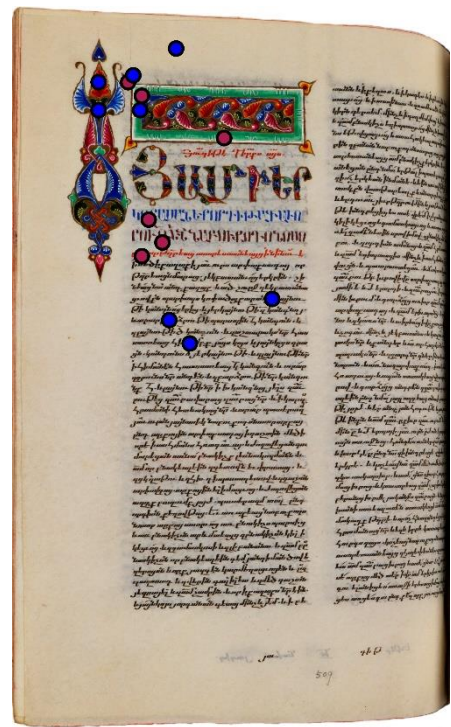
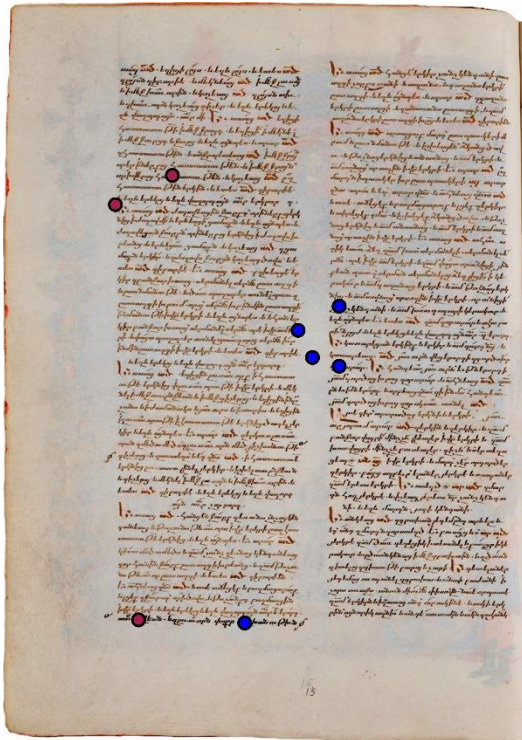


Figure H2. Bible LA 152, pages 15 and 509, © Gulbenkian Museum.

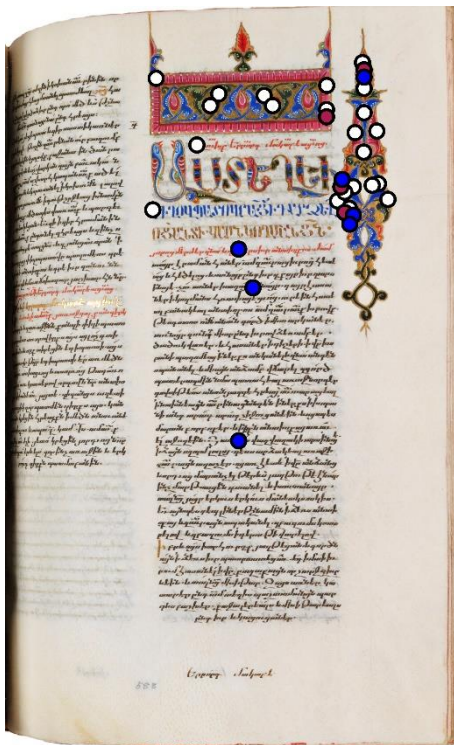


Figure H3. Bible LA 152, pages 588 and 631, © Gulbenkian Museum.



Figure H4. Bible LA 152, pages 795 and 796, © Gulbenkian Museum.

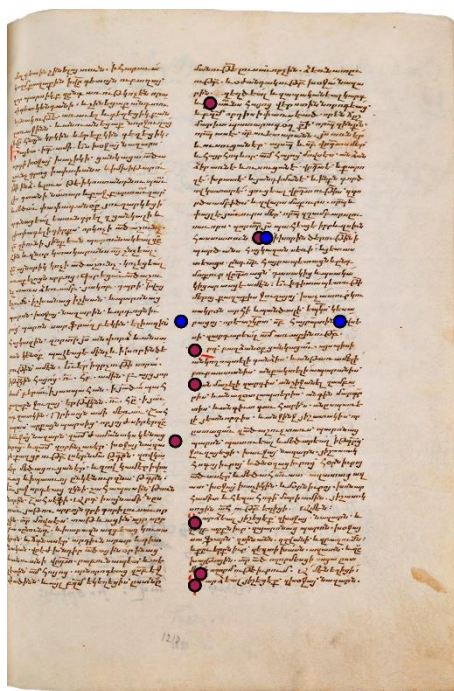


Figure H5. Bible LA 152, page 1210, © Gulbenkian Museum.



Figure H6. Gospel LA 193, pages 5 and 12, © Gulbenkian Museum.

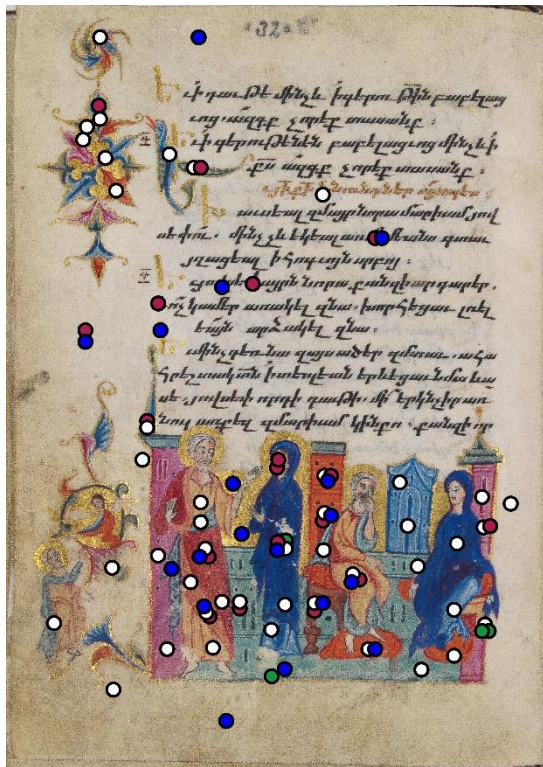


Figure H7. Gospel LA 193, pages 32 and 33, © Gulbenkian Museum.

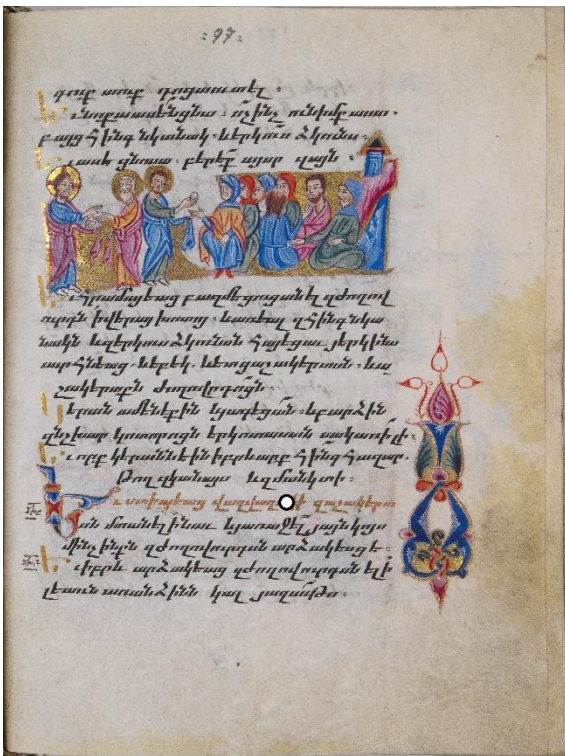


Figure H8. Gospel LA 193, pages 97 and 98, © Gulbenkian Museum.

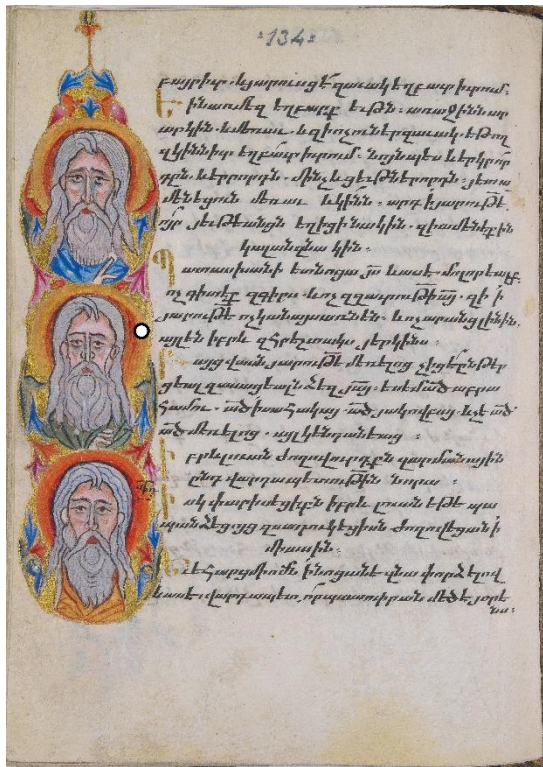


Figure H9. Gospel LA 193, pages 134 and 160, © Gulbenkian Museum.

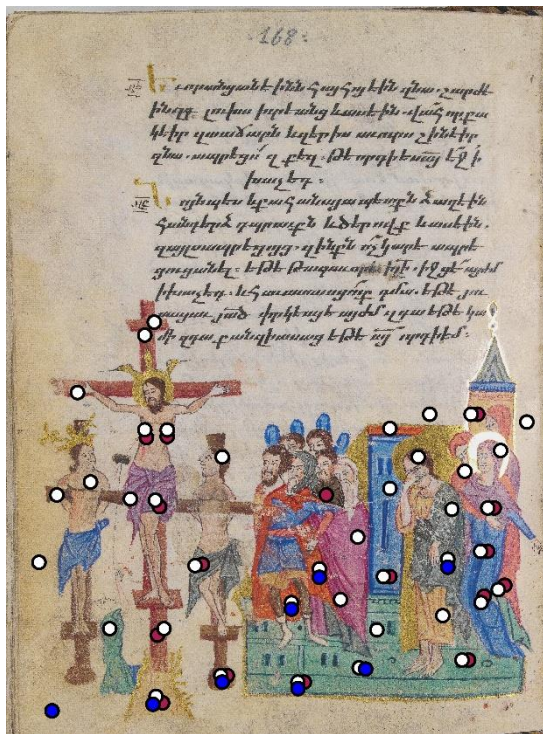


Figure H10. Gospel LA 193, pages 168 and 171, © Gulbenkian Museum.

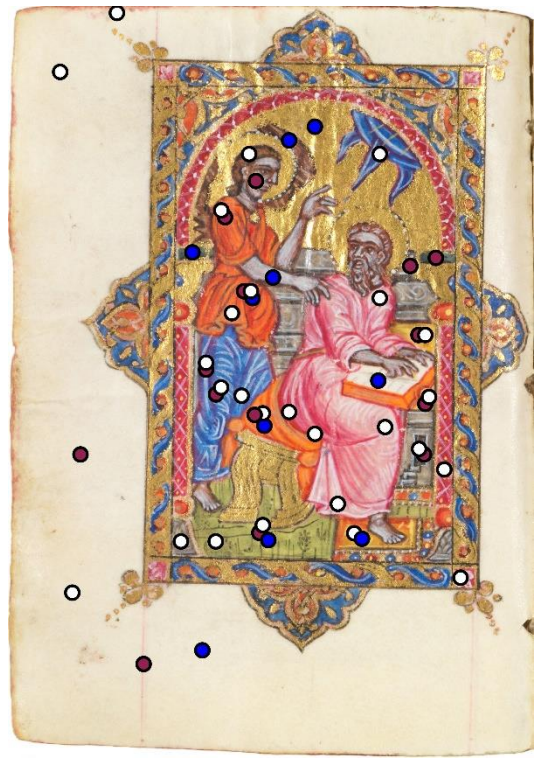


Figure H11. Gospel LA 216, folia 4r and 11v, © Gulbenkian Museum.



Figure H12. Gospel LA 216, folia 22v and 23v, © Gulbenkian Museum.

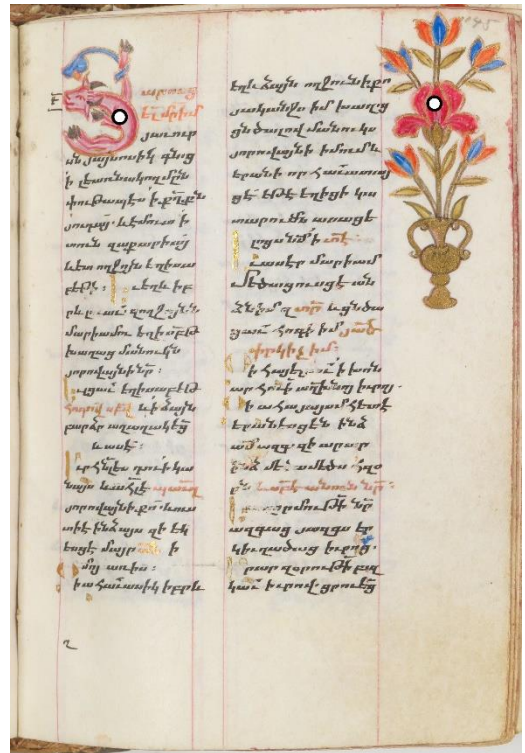


Figure H13. Gospel LA 216, folia 141v and 145r, © Gulbenkian Museum.



Figure H14. Gospel LA 216, folia 213v and 217r, © Gulbenkian Museum.

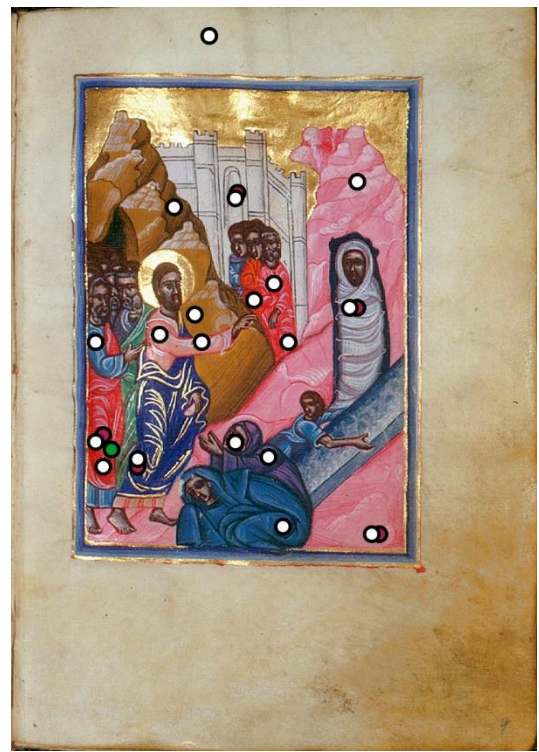
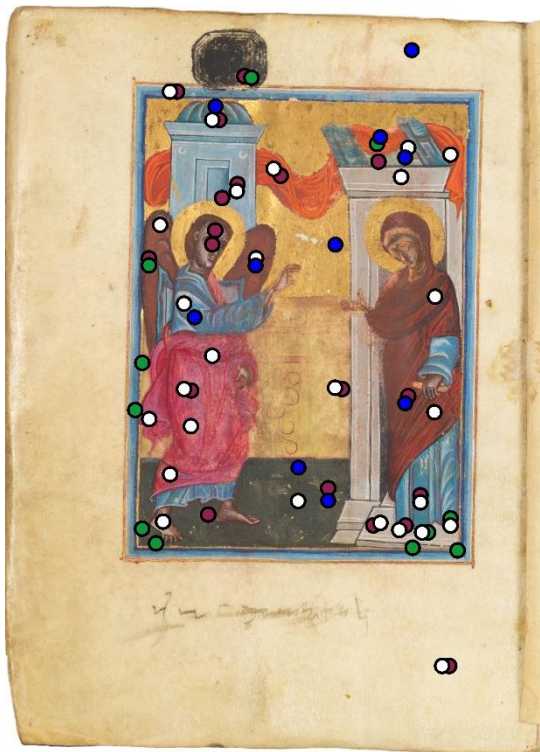


Figure H15. Gospel LA 253, folia 5v and 9r, © Gulbenkian Museum.



Figure H16. Gospel LA 253, folia 12v and 19v, © Gulbenkian Museum.

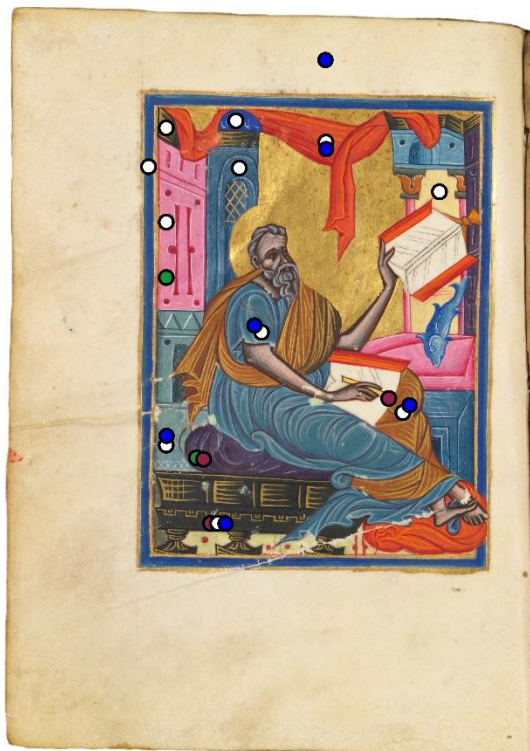


Figure H17. Gospel LA 253, folia 28v and 91v, © Gulbenkian Museum.

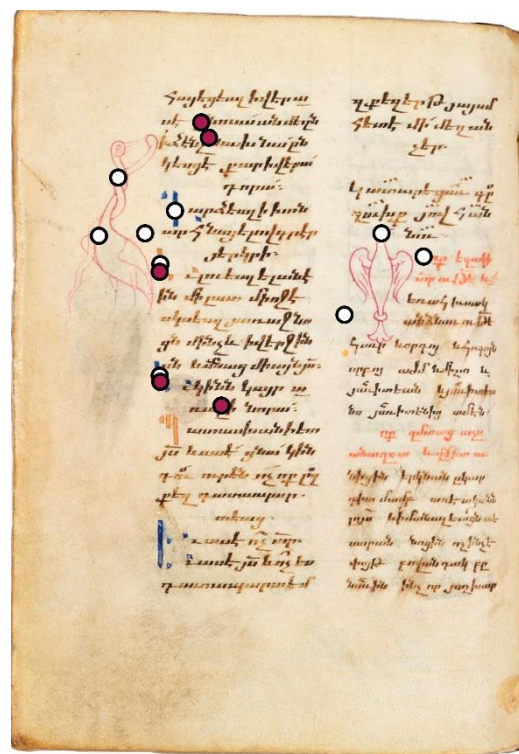


Figure H18. Gospel LA 253, folio 277v, © Gulbenkian Museum.

Appendix J

(Chapter 5)

Spectral Data

Appendix J. Spectral Data

Appendix J.1. Reflectance spectra and Raman spectra

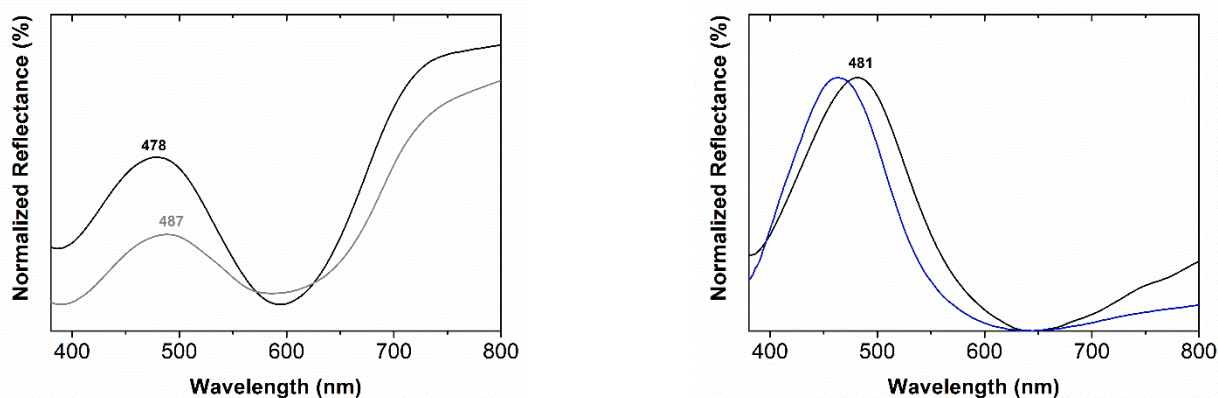


Figure J.1. Reflectance spectra of blue colors: *right*, lapis lazuli (black), LA152 p. 13, mixture with indigo (grey), LA253 f. 9r; *left*, azurite, LA253 f. 91v (black), compared with a reference of azurite applied on parchment (blue).

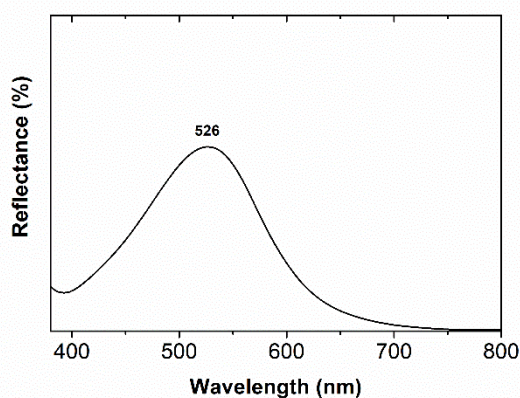


Figure J.2. Reflectance spectrum of malachite, from LA152 p.14.

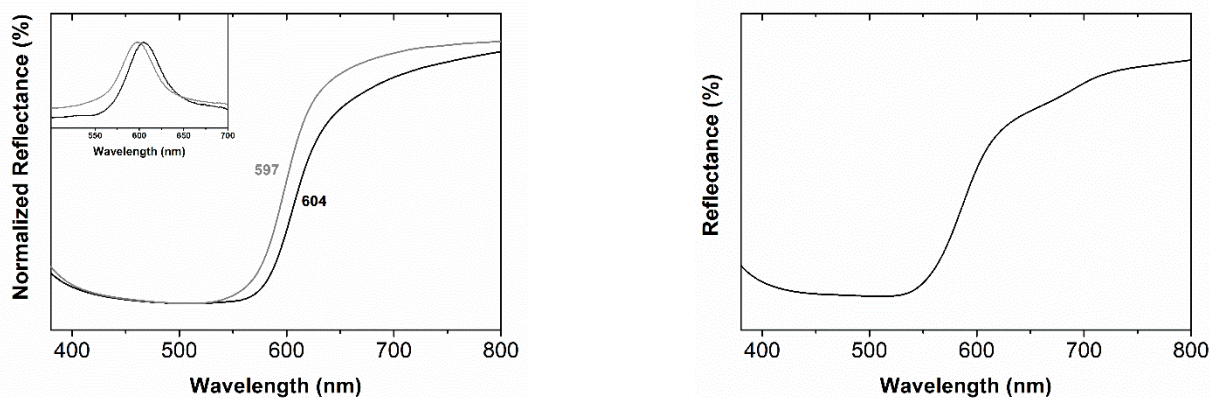


Figure J.3. Reflectance spectra of orange-red colors: *right*, vermilion (black), LA253 f. 19v, and a mixture of vermilion and minium (grey), LA152 p. 14. The insert shows the first derivative which allows us to identify the inflection point. *Left*, mixture of minium and orpiment, LA216 f. 11v.

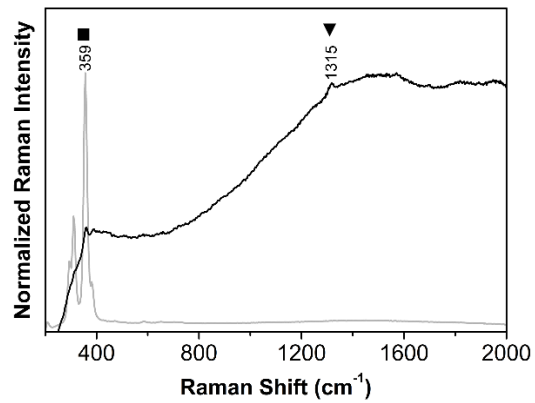


Figure J.4. Raman spectra of green color produced with orpiment (■) and lapis lazuli (▼), from LA152 p. 13.

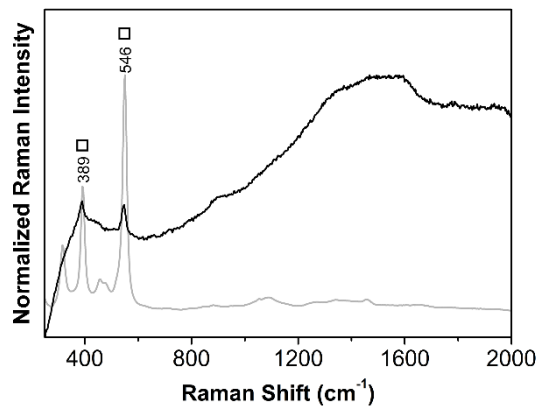


Figure J.5. Raman spectra of brown color found in LA152 p. 795, composed by minium (□) and carbon black.

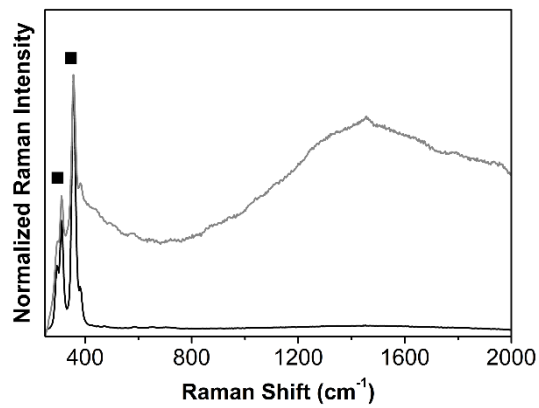


Figure J.6. Raman spectra of salmon color found LA152 p. 13, composed by cochineal, previously identified by FORS, and orpiment (■).

Appendix J.2. X-Ray Fluorescence Spectrometry | XRF Data

Table J.1. Net count areas and standard deviation for the oranges' key elements characteristic peaks.

Doc. Ref	Page	Area of Analysis	Area \pm Std.Dev.		
			Hg L	Pb L	As K
LA 152	13	1	4385 \pm 3	22,496 \pm 5	
		6	13,278 \pm 126	7393 \pm 101	
	14	1	19,492 \pm 149	23,721 \pm 164	
		5	1940 \pm 2	4957 \pm 3	
		10	1343 \pm 57	31,357 \pm 181	
	509	4	798 \pm 55	2036 \pm 71	15,452 \pm 159
	588	4	31,171 \pm 184	30,555 \pm 183	
		5	22,064 \pm 161	2357 \pm 76	
	795	7		22,298 \pm 171	21,017 \pm 273
				464 \pm 56	1534 \pm 76
10		4298 \pm 86	309 \pm 54		
3		12,254 \pm 124	176 \pm 54		
LA 193	32	3		21,540 \pm 5	6437 \pm 5
		6		11,474 \pm 118	
		7	18,046 \pm 4	17,896 \pm 3	127 \pm 5
	160	2	19,509 \pm 5	3196 \pm 2	
		4	47,038 \pm 7	5813 \pm 3	
		3	16,352 \pm 4	1286 \pm 2	
	4	17,587 \pm 4	3990 \pm 3	1924 \pm 3	
LA 216	4	1	11,924 \pm 4	9857 \pm 3	12,854 \pm 5
		3	1464 \pm 69	3658 \pm 100	20,459 \pm 195
		8	3670 \pm 84	4749 \pm 97	976 \pm 132
	11	2	3488 \pm 3	27,052 \pm 4	13,429 \pm 7
		4	6569 \pm 101	25,601 \pm 185	16,510 \pm 281
		6	10,734 \pm 121	12,740 \pm 146	4096 \pm 201
	22	1	11,065 \pm 123	19747 \pm 118	
	23	2	1388 \pm 70	6067 \pm 100	
	141	3	8604 \pm 110	12,493 \pm 146	3229 \pm 199
		5	6117 \pm 98	10,867 \pm 142	7565 \pm 204
		9	489 \pm 57	16,150 \pm 160	4232 \pm 220
213	5	329 \pm 52	11,344 \pm 139	4564 \pm 193	
LA 253	5	5	2902 \pm 2	6462 \pm 3	
	12	4	12,844 \pm 4	34373 \pm 5	7245 \pm 7
	19	2	5327 \pm 3	1514 \pm 1	247 \pm 2
	28	5	23,839 \pm 168	2719 \pm 74	

Table J.2. Net count areas and standard deviation for the yellows' key elements characteristic peaks.

Doc. Ref.	Page	Area of Analysis	Area \pm Std. Dev.	
			As K	Fe K
LA 152	509	2	8294 \pm 474	
LA 193	168	7	4716 \pm 466	
LA 216	4	3	23,300 \pm 622	
	23	1	2889 \pm 526	
	213	1	19,126 \pm 708	
	217	1	21,436 \pm 871	
		3	13,833 \pm 656	5834 \pm 93
LA 253	12	3	12,296 \pm 621	

Table J.3. Net count areas and standard deviation for the greens' key elements characteristic peaks.

Doc. Ref.	Page	Areas of Analysis	Area \pm Std. Dev.		
			Cu K	As K	Fe K
LA 152	13	2			
		7		2398 \pm 4	
	14	3	26,510 \pm 169	3787 \pm 441	
		7	83,357 \pm 294	2585 \pm 585	
		8		7860 \pm 3	
	509	1	126,419 \pm 360	3957 \pm 401	
	588	2	8464 \pm 3	2148 \pm 4	2756 \pm 2
	631	1	84,898 \pm 297	2636 \pm 378	
	795	3		14,003 \pm 737	
		9			
LA 193	32	5	7710 \pm 97	1043 \pm 468	
	160	1	51,543 \pm 233	3630 \pm 686	
		3	36,094 \pm 196		
	168	1	42,559 \pm 212		
2		40,501 \pm 207			
LA 216	4	5		17,858 \pm 5	
		7	15,700 \pm 134	4438 \pm 515	
	11	1		19999 \pm 5	
	141	1		24,323 \pm 859	
		8		11525 \pm 5	
	213	8	33,868 \pm 191	3664 \pm 599	
LA 253	5	1	1848 \pm 53	13,057 \pm 560	28,239 \pm 171
		3	1933 \pm 54	18,032 \pm 574	32,751 \pm 184
		9			
	12	1	3569 \pm 70	8464 \pm 637	16,752 \pm 133
	19	1	1701 \pm 56	50,358 \pm 668	
28	3		2573 \pm 826		

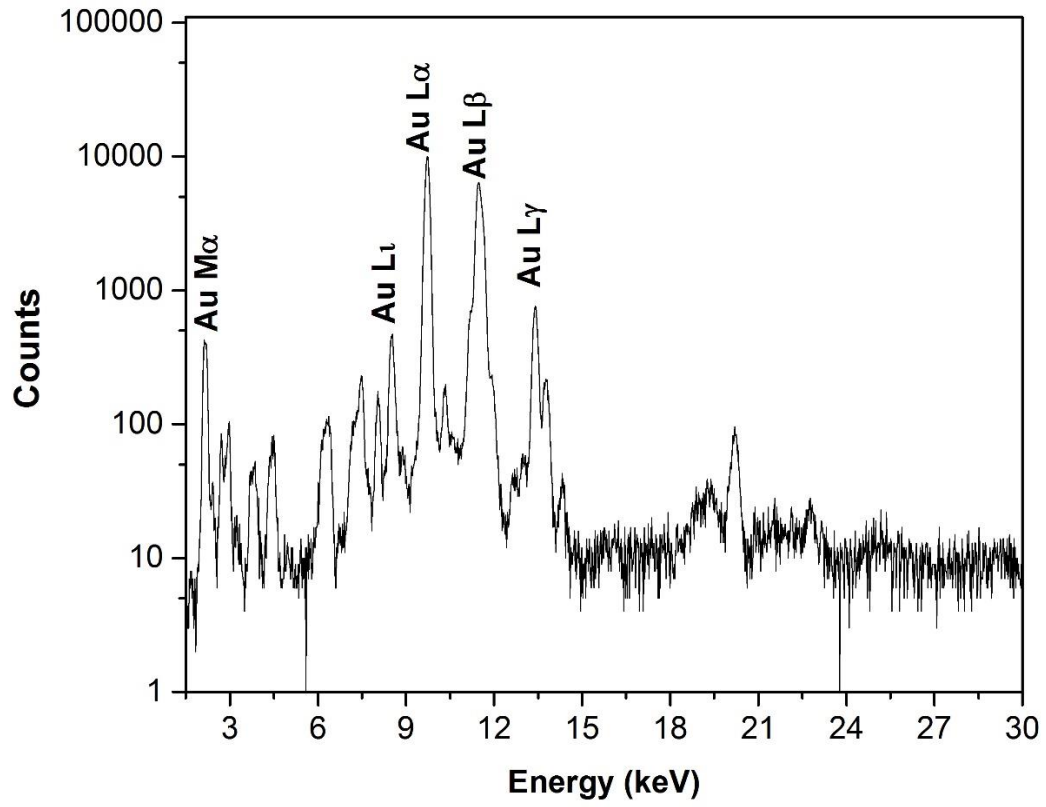


Figure J.7. XRF spectrum obtained at a gilded area from Bible LA 152.

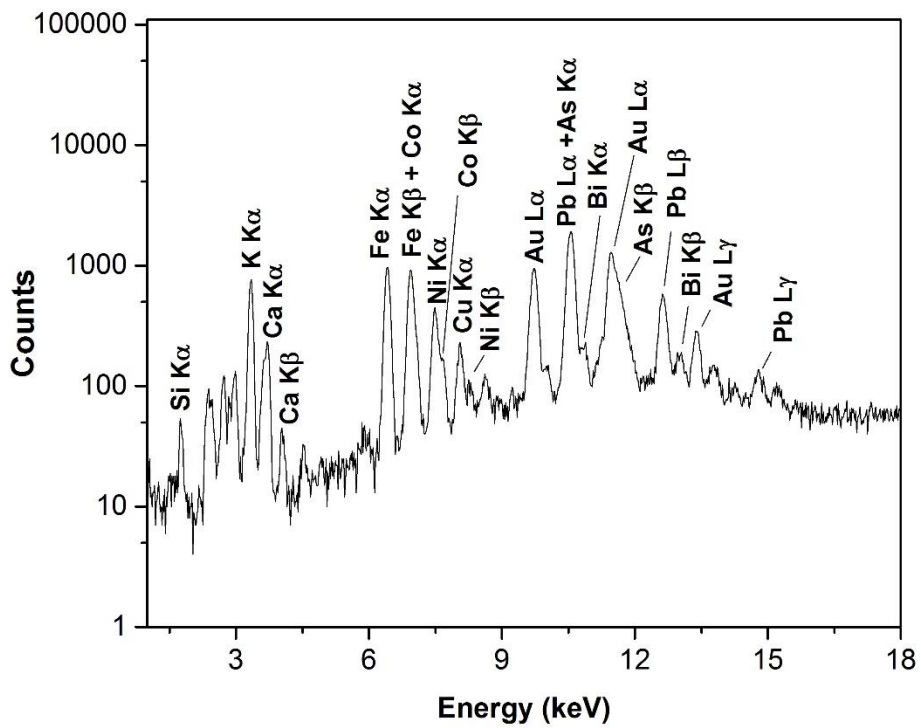


Figure J.8. XRF spectrum obtained at a blue area from Gospel LA 216.

Supplementary Material 1

Table S1. The list of organic and inorganic pigments identified in Armenian manuscripts. Names for the pigments are maintained with their initial designation by the authors. Acronyms for the techniques are provided at the end of the table.

Color	Dye/Pigment	Ms. Date	School	Sampling	Technique	Spectra	Ref.
WHITE							
	White Lead	1045-64	Kars	Yes	--	--	Cabelli 1984
	White Lead	1253-1348	Cilicia	Yes	PLM, XRD	No	Cabelli 1982-84
	White Lead	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
	White Lead	14 th c.	Van	Yes	Raman	No	Keheyani 2016a
	White Lead	1455-1575	Van	Yes	PLM, XRD	No	Cabelli 1982-84
	White Lead	15 th c.	Van	Yes	Raman	No	Keheyani 2018
	White Lead	16-17 th c.	Edessa	No	Raman	No	Keheyani 2016b
	Calcined bone	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
	Gypsum	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
	Anhydrite	13-14 th c.	Gladzor	Yes	XRD	No	Orna 1981
	Quartz	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
	<i>Tin white (Cassiterite)</i>	1487	Noravank	Yes	μ XRD	Yes	Brostoff 2010
YELLOW							
	Orpiment	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
	Orpiment	1348	Cilicia	Yes	PLM, XRD	No	Cabelli 1984
	<i>Orpiment</i>	14 th c.	Van	Yes	Raman	Yes	Keheyani 2016a
	Orpiment	15 th c.	Van	Yes	Raman	No	Keheyani 2018
	Orpiment	1455, 1575	Van	Yes	PLM, XRD	No	Cabelli 1982-84
	Orpiment	16-17 th c.	Edessa	No	FORS (UV-VIS), Raman, XRF	No	Keheyani 2016b
	Yellow ochre	16-17 th c.	Edessa	No	FORS (UV-VIS), Raman, XRF	No	Keheyani 2016b
	Gamboge	13-14 th c.	Gladzor	Yes	PLM (tentatively)	No	Orna 1981
	Organic beige	1455	Van	Yes	PLM, XRD	No	Cabelli 1982
GOLD							
	Gold	12-13 th c.	Cilicia	Yes	XRD	No	Cabelli 1982-84
	Gold	13-14 th c.	Gladzor	Yes	XRD, XRF	No	Orna 1981
	Gold	1475, 1575	Van	Yes	PLM, XRD	No	Cabelli 1982
	Gold leaf (on glue and Lead White)	16-17 th c.	Edessa	No	FORS (UV-VIS), Raman, XRF	No	Keheyani 2016b
	Gold shell	16-17 th c.	Edessa	No	FORS (UV-VIS), Raman, XRF	No	Keheyani 2016b
	<i>Gold leaf (on a brown layer of Cerussite, Hydrocerussite, and Carbon black)</i>	1665	Artsakh	Yes	Raman	Yes	Baraldi 2016

SILVER							
Silver	12-13 th c.	Cilicia	Yes	PLM, XRD	No	Cabelli 1984	
Silver	1455, 1475	Van	Yes	PLM, XRD	No	Cabelli 1982	
ORANGE							
Minium	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981	
Minium	14 th c.	Van	Yes	Raman, SEM/EDS	FTIR, No	Baraldi 2016	
<i>Red Lead</i>	<i>15th c.</i>	<i>Van</i>	<i>Yes</i>	<i>Raman</i>	<i>Yes</i>	<i>Keheyani 2018</i>	
Red Lead	1609	--	No	Raman	No	Maybury 2018	
<i>Minium</i>	<i>16-17th c.</i>	<i>Edessa</i>	<i>No</i>	<i>Raman</i>	<i>Yes</i>	<i>Keheyani 2016b</i>	
<i>Minium</i>	<i>17th c.</i>	<i>Cesarea</i>	<i>Yes</i>	<i>Raman</i>	<i>Yes</i>	<i>Baraldi 2016</i>	
Red Lead	1707	--	No	Raman	No	Maybury 2018	
Red Lead	18 th c.	--	No	Raman	No	Maybury 2018	
Realgar	1455	Van	Yes	PLM, XRD	No	Cabelli 1982	
RED							
Vermilion	1045-64	Kars	Yes	--	--	Cabelli 1984	
Vermilion	1253-1348	Cilicia	Yes	PLM, XRD	No	Cabelli 1982-84	
Vermilion	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981	
Vermilion	14 th c.	Van	Yes	SEM/EDS	No	Keheyani 2016a	
<i>Cinnabar</i>	<i>15th c.</i>	<i>Van</i>	<i>Yes</i>	<i>Raman</i>	<i>Yes</i>	<i>Keheyani 2018</i>	
Vermilion	1455-1575	Van	Yes	PLM, XRD	No	Cabelli 1982-84	
Vermilion	16 th c.	--	No	Raman	No	Maybury 2018	
Cinnabar	16-17 th c.	Edessa	No	FORS (UV-VIS), Raman, XRF	No	Keheyani 2016b	
Vermilion	1609	--	No	Raman	No	Maybury 2018	
Vermilion	17 th c.	Cesarea	Yes	Raman	No	Baraldi 2016	
Vermilion	1707	--	No	Raman	No	Maybury 2018	
Vermilion	18 th c.	--	No	Raman	No	Maybury 2018	
<i>Red ochre</i>	<i>974</i>	<i>--</i>	<i>Yes</i>	<i>Raman</i>	<i>Yes</i>	<i>Eliazyan 2021</i>	
Red lake (madder)	13-14 th c.	Gladzor	Yes	PLM, UV-VIS	No	Orna 1981	
Fluorescent dye (Armenian cochineal likely)	1665	Artsakh	Yes	Raman, SERS	No	Baraldi 2016	
Fluorescent dye (Armenian cochineal likely)	17 th c.	Cesarea	Yes	Raman, SERS	No	Baraldi 2016	
CARMINE							
Organic Red Lake	1045-64	Kars	Yes	--	--	Cabelli 1984	
Red Lake (probably Madder)	1253-1348	Cilicia	Yes	FTIR	No	Cabelli 1982-84	
Red Lake (probably Madder)	1455-1575	Van	Yes	FTIR	No	Cabelli 1982-84	
Red Lake	13-14 th c.	Gladzor	Yes	PLM, UV-VIS	No	Orna 1981	
<i>Red Lake (probably Madder)</i>	<i>1487</i>	<i>Noravank</i>	<i>Yes</i>	<i>FTIR</i>	<i>Yes</i>	<i>Brostoff 2010</i>	

PINK							
<i>Lac Dye probably</i>	15 th c.	Van	Yes	FORS (UV-VIS), SERS, Fluorimetry	Yes	Keheyanyan 2018	
<i>Armenian cochineal</i>	16-17 th c.	Edessa	No	FORS (UV-VIS)	Yes	Keheyanyan 2016b	
PURPLE							
Organic purple	1455	Van	Yes	PLM, XRD	No	Cabelli 1982	
BLUE							
Ultramarine	1045-64	Kars	Yes	--	--	Cabelli 1984	
Ultramarine	1253-1348	Cilicia	Yes	PLM, XRD	No	Cabelli 1982-84	
Ultramarine	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981	
Ultramarine	14 th c.	Van	Yes	Raman, SEM/EDS	No	Keheyanyan 2016a	
Ultramarine	1455-1575	Van	Yes	PLM, XRD	No	Cabelli 1982-84	
<i>Ultramarine</i>	1487	Noravank	Yes	XRF, ESEM/EDS, FTIR, μ XRD	Yes	Brostoff 2010	
<i>Ultramarine</i>	15 th c.	Van	Yes	Raman	Yes	Keheyanyan 2018	
Lapis Lazuli	16 th c.	--	No	Raman	No	Maybury 2018	
Ultramarine	16-17 th c.	Edessa	No	FORS (UV-VIS), Raman, XRF	No	Keheyanyan 2016b	
Lazurite	17 th c.	Cesarea	Yes	Raman	No	Baraldi 2016	
Lapis Lazuli	1707	--	No	Raman	No	Maybury 2018	
Lapis Lazuli	18 th c.	--	No	Raman	No	Maybury 2018	
Azurite	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981	
<i>Azurite</i>	1665	Artsakh	Yes	Raman	Yes	Baraldi 2016	
Smalt	1455	Van	Yes	PLM, XRD	No	Cabelli 1982	
<i>Smalt</i>	16-17 th c.	Edessa	No	FORS (UV-VIS), XRF	Yes	Keheyanyan 2016b	
<i>Indigo</i>	974	--	Yes	FTIR	Yes	Eliazyan 2021	
Indigo	1304	--	No	Raman	No	Maybury 2018	
Indigo	14 th c.	Van	Yes	FTIR	Yes	Keheyanyan 2016a	
<i>Indigo</i>	15 th c.	Van	Yes	Raman	Yes	Keheyanyan 2018	
Indigo	16 th c.	--	No	Raman	No	Maybury 2018	
Indigo	1609	--	No	Raman	No	Maybury 2018	
Indigo	16-17 th c.	Edessa	No	FORS (UV-VIS), Raman, XRF	No	Keheyanyan 2016b	
GREEN							
Verdigris	16-17 th c.	Edessa	No	FORS (UV-VIS), Raman, XRF	No	Keheyanyan 2016b	
Malachite	16-17 th c.	Edessa	No	FORS (UV-VIS), Raman, XRF	No	Keheyanyan 2016b	
<i>Antlerite</i>	14 th c.	Van	Yes	Raman	Yes	Keheyanyan 2016a	
<i>Antlerite</i>	17 th c.	Cesarea	Yes	Raman	Yes	Baraldi 2016	
Gamboge (olive)	13-14 th c.	Gladzor	Yes	PLM (tentatively)	No	Orna 1981	
BLACK							
Charcoal black	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981	

Carbon	14 th c.	Van	Yes	Raman, FTIR, SEM/EDS	No	Keheyani 2016a
Iron-gall ink carbon	15 th c.	Van	Yes	Raman, SEM/EDX	FORS, No	Keheyani 2018
Carbon Black	16-17 th c.	Edessa	No	FORS (UV-VIS), Raman, XRF	No	Keheyani 2016b
Carbon Black	17 th c.	Cesarea	Yes	Raman	No	Baraldi 2016

* PLM = Polarized light microscopy; XRD = X-ray Diffraction; XRF = X-ray Fluorescence; FORS = UV-Visible diffuse reflectance spectrophotometry with Optic Fibres; FTIR = Fourier Transform infrared spectroscopy; UV-VIS = UV-visible spectrophotometer; Raman = Raman microscopy; SERS = Surface-enhanced Raman spectroscopy; SEM/EDS = Scanning electron microscopy/energy dispersive x-ray spectrometry; ESEM/EDS = Environmental scanning electron microscopy/energy dispersive spectroscopy.

Supplementary Material 2

Table S2. The list of **pigment mixtures** identified in Armenian manuscripts. Names for the pigments are maintained with their initial designation by the authors. Acronyms for the techniques are provided at the end of the table.

Color	Dye/Pigment	Ms. Date	School	Sampling	Technique	Spectra	Ref.
YELLOW							
	Orpiment+Organic yellow	1045-64	Kars	Yes	--	--	Cabelli 1984
	Orpiment+Organic yellow	1253-1348	Cilicia	Yes	PLM, XRD	No	Cabelli 1984
	Orpiment+Organic yellow	1475	Van	Yes	PLM, XRD	No	Cabelli 1984
	Raelgar+Orpiment+ Gamboge+Massicot	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
	Orpiment+Massicot	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
BROWNISH YELLOW							
	Realgar+Orpiment+ Vermilion+Charcoal black	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
	Vermilion+Gamboge +Gypsum	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
	Vermilion+Gamboge	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
ORANGE							
	Vermilion+White Lead+Organic yellow	1045-64	Kars	Yes	--	--	Cabelli 1984
	Vermilion+White Lead+Organic yellow	1253-1348	Cilicia	Yes	PLM, XRD	No	Cabelli 1984
	Vermilion+White Lead+Organic yellow	1455-1575	Van	Yes	PLM, XRD	No	Cabelli 1984
	Vermilion+Orpiment +Organic yellow	1253-62	Cilicia	Yes	PLM, XRD	No	Cabelli 1982
	Vermilion+Orpiment +Organic yellow	1253-62	Cilicia	Yes	PLM, XRD	No	Cabelli 1982
	Orpiment+Minium	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
	Red Lead+Vermilion	1487	Noravank	Yes	XRF, ESEM/EDS	No	Brostoff 2010
	Red Lead+Vermilion	16 th c.	--	No	Raman	No	Maybury 2018
	<i>Cinnabar+Minium</i>	<i>16-17th c.</i>	<i>Edessa</i>	<i>No</i>	<i>Raman</i>	<i>Yes</i>	<i>Keheyani 2016b</i>
	Red Lead+Vermilion	1707	--	No	Raman	No	Maybury 2018
CARMINE							
	Red Lake + White Lead	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981

PINK								
Vermilion+White Lead	1253, 13 th c.	Cilicia	Yes	PLM, XRD	No	Cabelli 1984		
Tin white+Red Lake likely	1487	Noravank	Yes	XRF, ESEM/EDS, FTIR, μ XRD	No	Brostoff 2010		
PURPLE								
Vermilion+Organic red and blue	1045-64	Kars	Yes	--	--	Cabelli 1984		
Vermilion+Organic red and blue	1253-1348	Cilicia	Yes	PLM, XRD	No	Cabelli 1984		
Vermilion+Organic red and blue	1455-1575	Van	Yes	PLM, XRD	No	Cabelli 1984		
Vermilion+Ultramarine+Organic red	1045-64	Kars	Yes	--	--	Cabelli 1984		
Vermilion+Ultramarine+Organic red	1253-1348	Cilicia	Yes	PLM, XRD	No	Cabelli 1984		
Red lake+Ultramarine	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981		
BLUE								
Indigo+Cinnabar (dark blue/violet)	14 th c.	Van	Yes	Raman, SEM/EDS	FTIR, No	Keheyan 2016a		
Indigo+Cinnabar (dark blue/violet)	15 th c.	Van	Yes	Raman, SEM/EDX	FORS, No	Keheyan 2018		
<i>Ultramarine+Smalt+ Tin White+possibly Quartz, Indigo, and Lead White (medium blue)</i>	1487	Noravank	Yes	XRF, ESEM/EDS, FTIR, μ XRD	Yes	Brostoff 2010		
GREEN								
Orpiment+Organic blue	1045-64	Kars	Yes	--	--	Cabelli 1984		
Vermilion+White Lead+Organic blue and yellow (olive)	1262	Cilicia	Yes	PLM, XRD	No	Cabelli 1984		
Orpiment+Organic blue	1253-1348	Cilicia	Yes	PLM, XRD	No	Cabelli 1984		
Orpiment+Organic blue	1455-1575	Van	Yes	PLM, XRD	No	Cabelli 1982		
Organic yellow+Ultramarine	1253-1348	Cilicia	Yes	PLM, XRD	No	Cabelli 1984		

Orpiment+ Ultramarine	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
Orpiment+Gamboge + Ultramarine	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
Orpiment+ Ultramarine+ Vermilion+Anhydrite	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
Orpiment+Azurite	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
Orpiment+Indigo (Vergaut)	14 th c.	Van	Yes	Raman	Yes	Keheyan 2016a
Orpiment+Indigo (Vergaut)	15 th c.	Van	Yes	Raman, (UV-VIS), SEM/EDX	FORS	No Keheyan 2018
Indigo+Orpiment	1609	--	No	Raman	No	Maybury 2018
Indigo+Orpiment	16-17 th c.	Edessa	No	FORS, Raman, XRF	No	Keheyan 2016b
Indigo+Litharge (light green)	1665	Artsakh	Yes	Raman	Yes	Baraldi 2016

BROWN

Vermilion+Orpiment +Gypsum+Charcoal black	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
Vermilion+Orpiment +Whiting+Charcoal black+Iron oxide hydrate	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
White Lead+ Orpiment+Vermilion and black pigment	1348	Cilicia	Yes	PLM, XRD	No	Cabelli 1984
Massicot+Carbon	1665	Artsakh	Yes	Raman	Yes	Baraldi 2016

FLESH

Vermilion+White Lead+Organic yellow	1253, 1262	Cilicia	Yes	PLM, XRD	No	Cabelli 1984
Orpiment+Realgar	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
Orpiment+Realgar+ Gamboge+Gypsum	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
Vermilion+Anhydrite +Gamboge	13-14 th c.	Gladzor	Yes	PLM, XRD	No	Orna 1981
Vermilion-based (flesh+drawing lines)	1487	Noravank	Yes	XRF	No	Brostoff 2010

INKS							
Black ink: Iron-gall	974	--	Yes	FTIR		Yes	<i>Eliazyan 2021</i>
Black ink: Iron-gall (from the painted area)	14 th c.	Van	Yes	Raman, SEM/EDS	FTIR,	No	<i>Keheyanyan 2016a</i>
Black ink: Iron-gall	14-15 th c.	various	No	NIR		No	<i>Rabin 2014</i>
Black ink: Iron-gall	16 th c.	--	Yes	Py/GC/MS		Yes	<i>Keheyanyan 2009</i>
Black ink: Iron-gall	15 th c.	Van	Yes	Raman, SEM/EDX	FORS,	Yes	<i>Keheyanyan 2018</i>
Red ink: Cinnabar	14 th c.	Van	Yes	Raman, SEM/EDS		No	<i>Keheyanyan 2016a</i>
Red ink: Vermilion	1487	Noravank	Yes	XRF		No	<i>Brostoff 2010</i>
Red ink: Cinnabar	16 th c.	--	Yes	Py/GC/MS		Yes	<i>Keheyanyan 2009</i>

* PLM = Polarized light microscopy; XRD = X-ray Diffraction; XRF = X-ray Fluorescence; FORS = UV-Visible diffuse reflectance spectrophotometry with Optic Fibres; FTIR = Fourier Transform infrared spectroscopy; UV-VIS = UV-visible spectrophotometer; Raman = Raman microscopy; SERS = Surface-enhanced Raman spectroscopy; SEM/EDS = Scanning electron microscopy/energy dispersive x-ray spectrometry; ESEM/EDS = Environmental scanning electron microscopy/energy dispersive spectroscopy; SEM/EDX = Scanning electron microscopy/energy dispersive X-ray spectroscopy; NIR = Near Infrared Reflectography; Py/GC/MS = Pyrolysis/gas chromatography/mass spectrometry.

